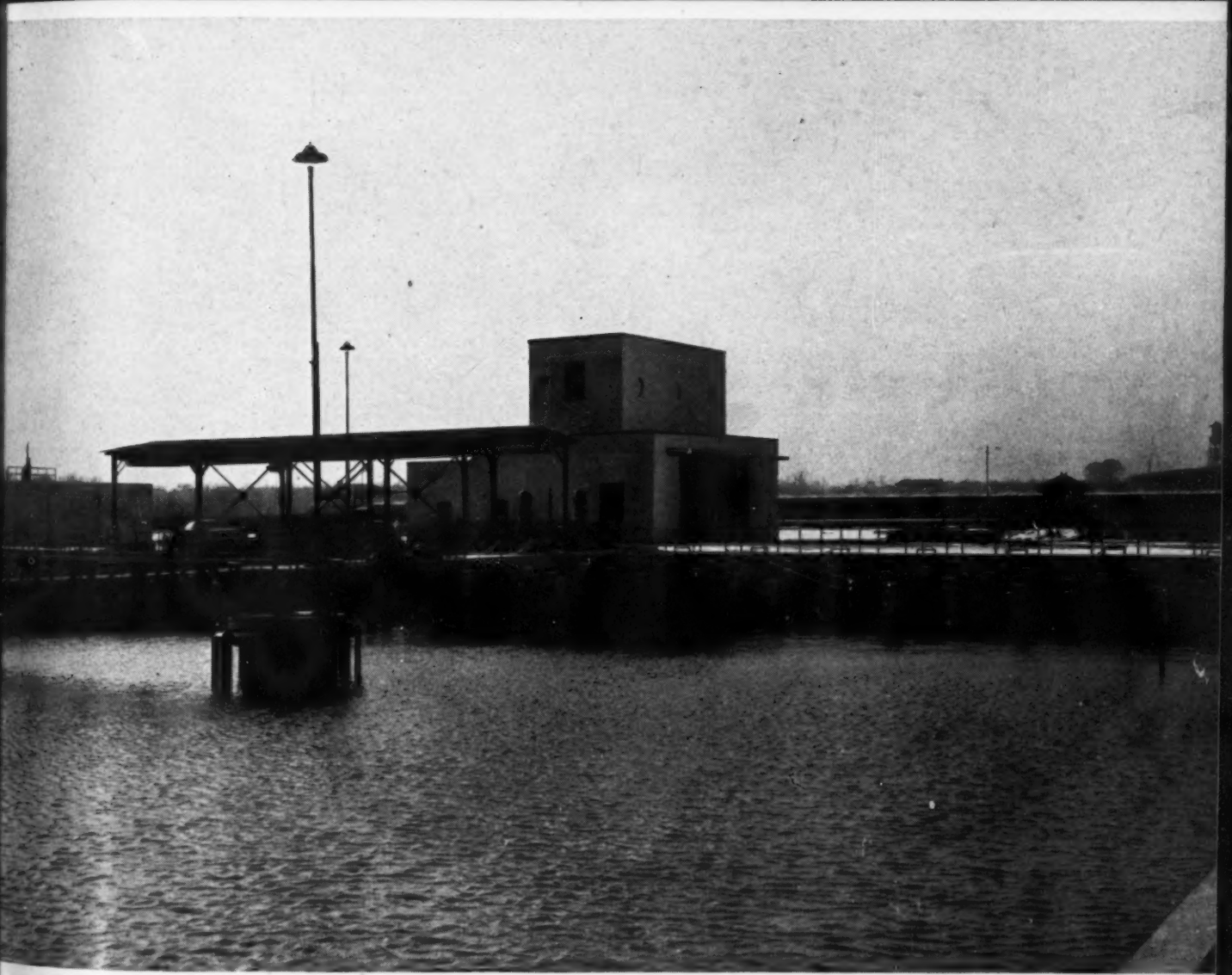
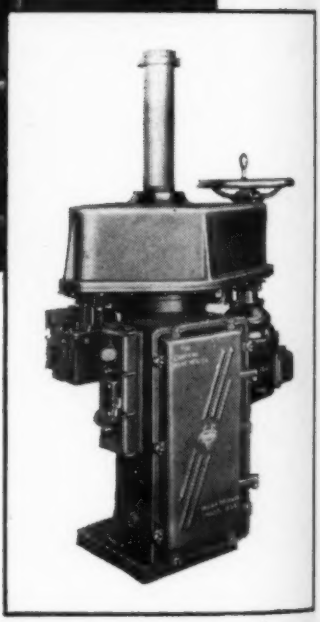
WATER & SEWAGE WORKS



1946 NOT WITHOUT ITS SUCCESS STORY—A PLANT TO BE DOUBLED

30 mgd. of industrial water from effluent purchased from Baltimore's Sewage Works, by Bethlehem Steel Co.

CHAPMAN
SLUICE GATES



May Be Operated by Hand, by Hydraulic Cylinder or Electrically Through Motor-Operated Floor Stand

Many types of sluice gates that once were "specials" are now included in the Chapman Standard Line. As a rule, you can usually find just what you want in this line; our engineers will be glad to work with you in all your problems.

Chapman Sluice Gates may be operated by hand, by hydraulic cylinder or electrically. The Chapman Motor unit (at right) is completely enclosed in a weatherproof housing—is delivered wired and ready to install. Handwheel is provided for emergency operation when power fails. Write for complete details.

THE CHAPMAN VALVE MANUFACTURING CO.
INDIAN ORCHARD, MASSACHUSETTS

WATER AND SEWAGE WORKS, February, 1947. Volume 94, Number 2. Published monthly by Gillette Publishing Co., 22 West Maple St., Chicago 10, Ill. Per copy, 25c. Subscription rate: United States, $2.00 per year; Canada, $2.00 per year; Foreign, $3.00 per year. Entered as Second Class Matter, March 12, 1946, at the Post Office at Chicago, Ill., under act of March 3, 1879.

how PRECISION begets PRECISION TO your ADVANTAGE

The measuring chamber halves of Pittsburgh Disc Meters are bored, turned, grooved, chamfered and faced in successive automatic operations on this especially designed machine. Rigid tolerances are held by gauge inspection with readings taken in ten-thousandths of an inch. Other equally accurate automatics finish turn the disc surfaces.

Precision in meter measurement largely depends upon precision in manufacture. And the precision with which today's Pittsburgh Arctic and Tropic type meters are made on new, specially built automatic equipment means long term savings to the disc meter buyer. Exacting dimensional control over all component parts assures a perfectly fitted, perfectly balanced meter—a meter that will maintain its initial high accuracy for many years without breakdowns, sticking or premature wear—a meter that costs less because it measures more.

Now's the time to learn about the new, high performance standards in Pittsburgh Disc Meters that our *exclusive* precision manufacturing methods make possible. Ask your nearest sales office for a demonstration.

PITTSBURGH EQUITABLE METER DIVISION
Rockwell Manufacturing Company
Pittsburgh 8, Pa.

Atlanta, Boston, Chicago, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa

PITTSBURGH DISC METERS

LANDMARKS

. . . in beautiful Evanston, Illinois

Year after year LUDLOW Hydrants continue to guard life and property in thousands of communities all over the country. Landmarks of security, they are accepted by residents as a part of the traditional American scene.

LUDLOW Hydrants are faithfully serving 90% of all Evanston. Always ready with quick water for any emergency, they provide proper shut-off without water hammer — correct drainage — easy inspection and servicing.

THE LUDLOW VALVE MFG. CO., INC.

TROY • N. Y.

At right — LUDLOW List 90 Slide Gate Hydrant, embodying all the latest improvements in manufacture.

LUDLOW HYDRANTS & VALVES

SINCE 1866

H-72

. . . handling both domestic and industrial loads and providing a reserve of water for emergencies at Auburn, Ind.

with the aid of a

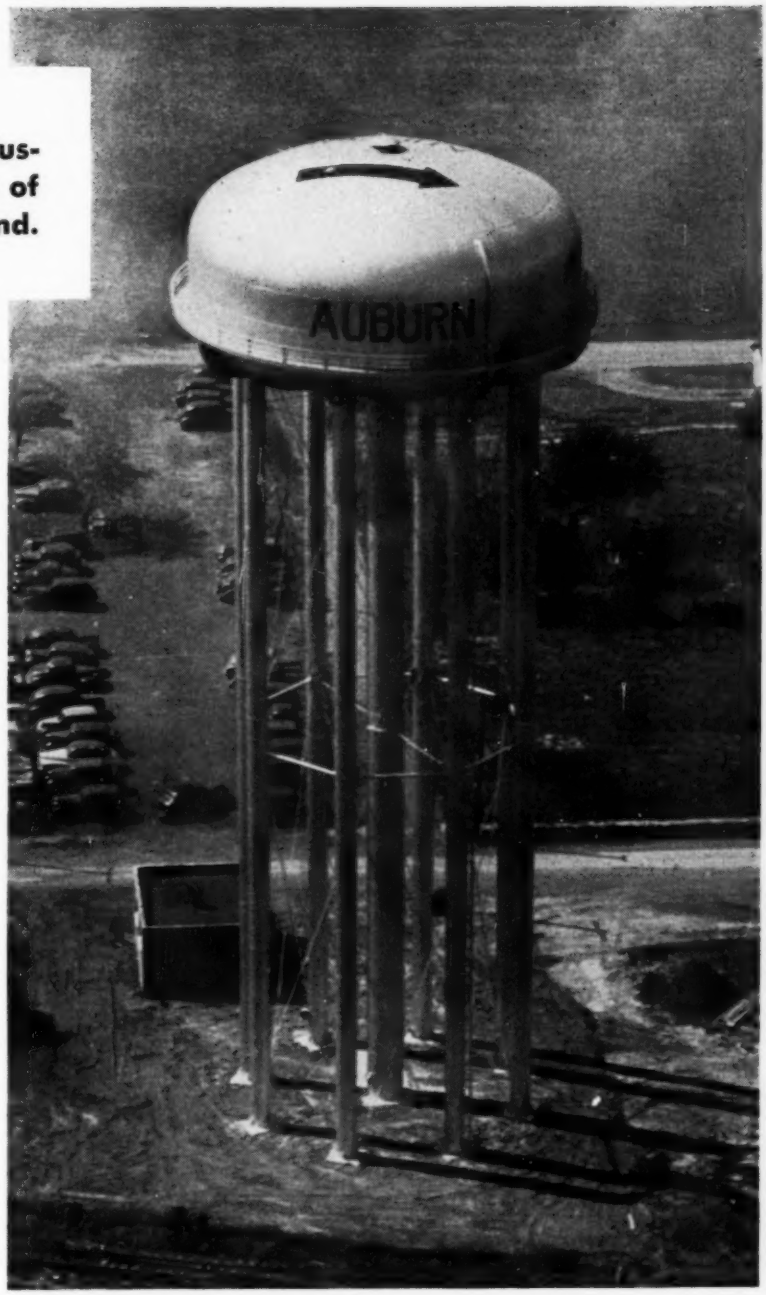
HORTON ELEVATED TANK

This community's experience with elevated water storage is a story that could be told by many communities. It goes like this:

Prior to the erection of the elevated tank the water distribution system was inadequate for handling both domestic and commercial loads and emergencies such as large fires and temporary power failures. The Horton elevated tank, shown at the right, together with larger mains, has enabled the Auburn Electric and Water Department to overcome these conditions.

Elevated water storage can also be the determining factor in eliminating a wide fluctuation in pressure in a distribution system. Since the erection of Auburn's elevated tank, daily pressures vary only 3 lbs. per sq. in. The distribution system supplies water to 1,300 customers. Average daily consumption is 672,860 gals.

Write our nearest office for quotations on Horton all-welded elevated tanks when planning water storage for municipal service.



The above photo shows the Horton elevated tank at Auburn, Indiana. It holds 500,000 gals. and is 130 ft. 6 in. to bottom.

ENGINEERING DATA

Area Served by Elevated Tank—1.25 square miles.
Source of Water—Wells.
Length of Distribution Mains—115,971 lineal feet.
Size of Distribution Mains—4 in., 6 in., 8 in., 10 in., 12 in.
Minimum Daily Consumption—386,750 gals.
Maximum Daily Consumption—976,500 gals.

CHICAGO BRIDGE & IRON COMPANY

Chicago 4.....2198 McCormick Bldg.
New York 6.....3390-165 Broadway Bldg.
Cleveland 15.....2262 Guildhall Bldg.
Los Angeles 14.....1455 Wm. Fox Bldg.
Birmingham 1.....1586 North 50th St.
Atlanta 3.....2181 Healey Bldg.
Plants in Birmingham, Chicago and Greenville, Pa.

Tulsa 3.....1646 Hunt Bldg.
Houston 1.....5615 Clinton Dr.
Philadelphia 3.....1644-1700 Walnut St. Bldg.
Havana.....402 Abreu Bldg.
San Francisco 11.....1283-22 Battery St. Bldg.
Detroit 26.....1551 Lafayette Bldg.
In Canada: Horton Steel Works, Limited, Fort Erie, Ont.

What can you do today to help the health official of tomorrow?

WILL HE HAVE SOMETHING to say to you—this health official of tomorrow?

A word of thanks, perhaps, for making the world of tomorrow a better place in which to live. A cleaner, healthier place.

Yes, many of the decisions you make today will be reflected in the cities of the future. And one of those decisions—an important one, we think—is what to do about the garbage can—breeding ground of germs that threaten the health of every community.

Just as sanitation pioneers of another era helped curb epidemics, such as typhoid, by removing the outhouse, so, too can you join the fight against infectious diseases by removing the garbage can.

In fact, in more than 300 communities, forward-looking sanitation experts have taken steps toward the complete elimination of garbage. In these progressive cities, they have modernized outdated municipal sanitation practices by authorizing the installation of a new and revolutionary food-waste disposal unit in homes.

This unit—the General Electric DISPOSALL*—shreds food waste and flushes it *instantly* into the sewer system.

Certainly you, too, are interested in the prospect of a garbage-free community. Certainly you will want to know all the facts about the DISPOSALL—all the pertinent questions and answers about a device which, we feel, represents the next great achievement in sanitation.

QUESTIONS AND ANSWERS ABOUT THE DISPOSALL METHOD OF ELIMINATING GARBAGE

1. Has the Disposall been thoroughly tested?

Yes! More than ten years of testing in research laboratories and practical use in thousands of homes in several hundred communities have proved the Disposall to be 100 per cent efficient.

2. Will the use of Disposalls cause sewer stoppages?

No! The Disposall shreds food waste into such fine particles that it flows freely through pipe lines, without shoaling or settling.

Disposall processed food waste is smaller, more water-buoyant and uniform in character than sewage solids now flowing through your lines. This waste is ground in a controlled amount of cold water, which congeals and homogenizes greases into a form that will not clog sewer lines.

3. Should food waste be immediately removed from the home?

Yes! Food waste—allowed to stand—quickly becomes garbage. And that is when it becomes dangerous. Since it is organic matter—odorous and putrefactive—it is a ready source of disease, attracting germ-spreading flies and rodents.

You, who are so familiar with the danger of similar organic matter in the form of human wastes, know that—like the outhouse of yesterday—the garbage can should be banished. The Disposall *can* and *should* replace it!

4. Will you have to expand your plant's capacity?

It would be many years before the number of Disposalls in your community would become large enough to increase appreciably the loading on the treatment plant. Even if *every* home used a Disposall, the volume of flow through your sewer system would be increased by *less than two per cent.*

Naturally, the addition of food waste to the sewage flow will increase the solids and organic loading on the plant. But many plants will be able to handle this increased loading for a number of years; others can be expanded in future years, when necessary.

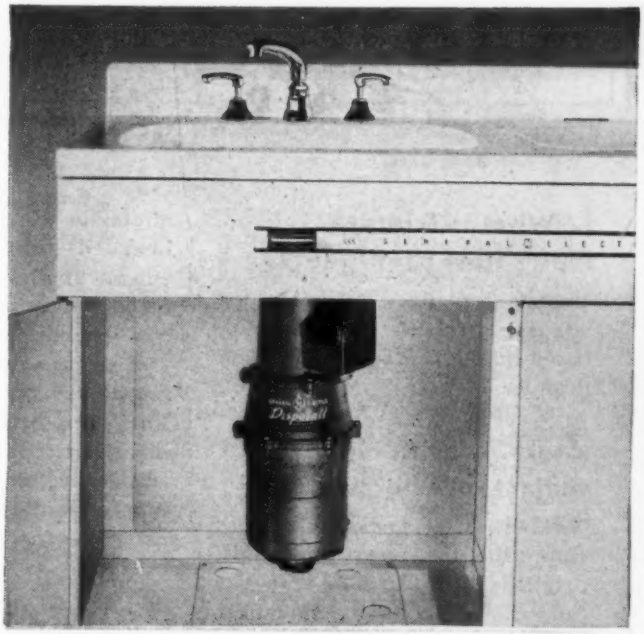
5. Are sewage treatment plants needed?

As a protection for community health, there can be no question about the need for treatment plants—whether or not Disposalls are used.

We hope that the Disposall provides *another* good reason . . . another health reason . . . for building treatment plants. They are needed!

6. How can you get more information?

Further information about the Disposall is yours for the asking. We will be glad to send you all information, as well as answers to any specific questions you may wish to ask. Please write to Department **WSW247,** General Electric Company, Bridgeport 2, Connecticut.



The General Electric Disposall shown installed in our Electric Sink. Food waste is scraped into drain opening and safety cover placed in position. Cold water tap is then turned on, starting the Disposall operation. Food waste is shredded and flushed away automatically.

Disposall

*TRADE-MARK REG. U. S. PAT. OFF.

CONVERTS FOOD WASTE TO SEWAGE—ELIMINATES "GARBAGE"

GENERAL ELECTRIC

Johns-Manville answers 13 QUESTIONS frequently asked about TRANSITE* PRESSURE PIPE

*Transite is a registered Johns-Manville trade mark

1. What is Transite Pipe's flow coefficient?

The conservative "C" value for Transite Pressure Pipe is 140, based on the Williams and Hazen formula.

2. Is Transite Pipe subject to tuberculation?

No! Transite's asbestos-cement composition is assurance that its original high carrying capacity cannot be reduced by tuberculation.

3. What economic advantages result from Transite's immunity to tuberculation?

Transite's complete freedom from tuberculation provides substantial savings in the initial cost of the system as well as in maintenance and operating costs.

It means, first, that you don't have to resort to larger-than-necessary pipe to offset the progressive reduction of carrying capacity caused by tuberculation. Without "over-designing," you can specify minimum size pipe to do the job intended—providing flow for present needs and those incident to increasing population and industrial growth.

It means also that the pipe you install *now* won't have to be cleaned, lined, reinforced with additional mains, or replaced altogether because tuberculation has clogged its interior and reduced its original carrying capacity.

4. How about pumping costs?

Here again, Transite's non-tuberculating asbestos-cement structure pays off. In a Transite line it is not necessary to increase pumping pressures to compensate for the effects of tuberculation. Thus, pumps can operate at higher efficiencies—an economy which is helping to keep down water rates for the taxpayer in many communities served by Transite water lines.

5. Does Transite withstand corrosive soils?

In just about every type of soil, Transite has demonstrated its superior resistance to soil corrosion. This statement has been substantiated by impartial comparative studies conducted both by government and private agencies.

For example, one series of studies revealed that the corrosive effect of many types of aggressive soils on Transite Pipe was practically negligible after exposure over an extended period. Other pipe materials subjected to the same tests were substantially affected by corrosion, but the strength of the Transite Pipe actually increased under identical test conditions.

Another indication of Transite's unusual corrosion resistance is its performance in coal mine service. Here, the conveying of acid mine drainage waters is a severe test of the corrosion resistance of any pipe—so severe that the life of a drainage line is sometimes measured in terms of months or only weeks. Yet under these conditions some of the earliest coal mine installations of Transite Pipe, laid more than 12 years ago, are still in use today. Several of them have

outlived the mines in which they were originally installed and are now serving in new operations.

6. What about electrolysis?

Electrolysis is no problem in a Transite water line, for Transite, being non-metallic, is immune to electrolytic action. You can lay this pipe alongside street car or power lines or in the proximity of power stations, with complete confidence that it cannot be harmed by stray ground currents.

7. How about strength?

Three factors contribute to the high uniform strength of Transite Pipe:

1. Its tough, strong asbestos-cement composition (asbestos fibers have a tensile strength as high as 400,000 lbs. per square inch).
2. The method used to form the pipe during manufacture—it is built up under tremendous pressure into a dense, homogeneous structure.
3. The special curing process which follows the forming operation and develops maximum strength in the finished product.

And, Transite's resistance to virtually all types of soil corrosion is assurance that the strength which is built into this pipe at the factory *is built in to stay!* Its record of successful performance under adverse conditions is proof that Transite *maintains* its strength.

8. Does Transite Pressure Pipe provide tight joints?

Yes. Due to the Simplex Coupling, joint troubles in Transite lines are few and far between.

The design of the Simplex Coupling is simplicity itself. Consisting only of a Transite sleeve and two rubber rings, it is, in effect, a factory-made joint which is merely *assembled* on the job. The operation requires only that the sleeve be pulled over the ends of the pipe, which rolls and compresses the rubber rings into place between sleeve and pipe. Thus rubber, which provides one of the most effective of seals, safeguards the tightness of the line. Furthermore, each joint is readily checked for proper assembly as the pipe is laid, providing advance assurance that the line will pass leakage tests.

And because it is a *flexible* joint, the Simplex Coupling offers an important additional advantage after the pipe is in service. Its flexibility helps compensate for soil movement and other stresses to which the pipe may be subjected, thereby helping protect against joint leakage. This also provides a safeguard against washing away of the supporting soil and possible pipe breakage.

9. How much deflection is possible at the joints?

A deflection of 5° or more at each joint is possible on most installations of Transite Pressure Pipe—an important advantage when laying pipe around curves and in hilly terrain.

10. What installation economies does Transite provide?

It is an exceptionally economical pipe to handle and install. The lightweight sections make the use of mechanical handling equipment unnecessary except for the largest sizes. The Simplex Coupling employed assures a fast assembly job in the trench. Under most conditions, the pipe can be laid as fast as the trenching machine can do its work. In fact, because of this feature, many installations have been made with the same foreman supervising both excavation and pipe laying. And because of its rapid assembly, pipe installation jobs are completed sooner, minimizing street tie-ups and traffic annoyances.

11. Are service connections easily made?

Yes. Transite Pipe can be drilled and tapped with standard tapping tools and methods. Connections are strong and watertight. Connections to valves and fittings, cut-ins for valve insertions and branch take-offs, etc., are made by conventional methods.

12. In what diameters is Transite Pressure Pipe made?

Designed for both supply and distribution lines, Transite is made in diameters ranging from 3″ up to 36″.

13. What working pressures will Transite handle?

Four classes are made—for working pressures of 50, 100, 150 and 200 pounds per square inch. To assure an ample factor of safety, each length of pipe and each coupling is factory tested before shipment at four times its specified working pressure.

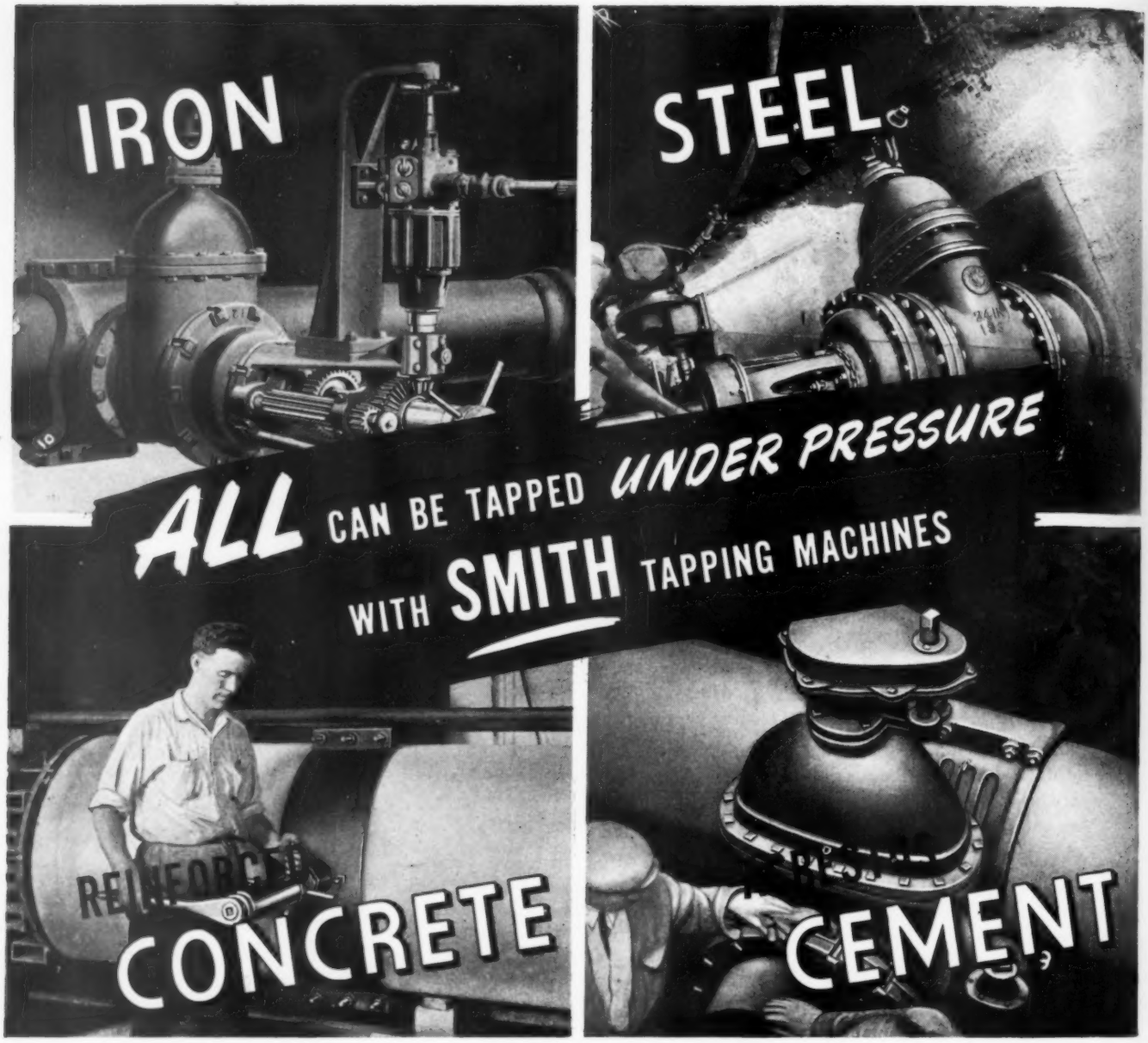
Have you any further questions?

If you would like additional information about Transite Pressure Pipe, send for brochure TR-11A. Or if you prefer, ask to have a Johns-Manville representative call. Address Johns-Manville, Box 290, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE PRESSURE PIPE

An Asbestos Product



With A. P. Smith tapping equipment you can make branch connections up to 42" under full pressure on any type or size of pipe, without interrupting the flow, draining the line, or riling the water. These machines are for use with SMITH tapping sleeves, hat flanges, and tapping valves. The entire operation is quick, simple and satisfactory.

Write to the A. P. Smith Manufacturing Company for further information.

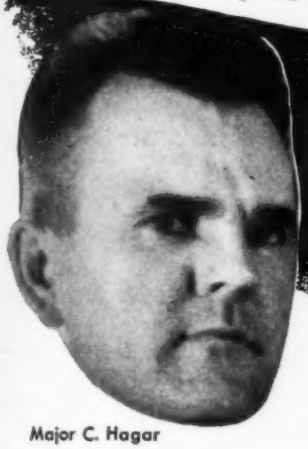
FIRE HYDRANTS
GATE VALVES
CHECK VALVES
INSERTING VALVES
TAPPING SLEEVES AND VALVES
WATER SERVICE BRASS GOODS

THE A. P. SMITH MFG. CO.

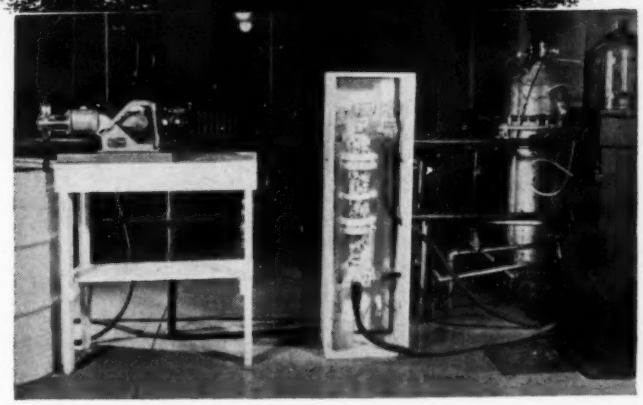
EAST ORANGE, NEW JERSEY

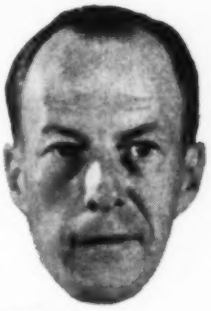
FLOOR STANDS
INDICATOR POSTS
TAPPING MACHINES
INSERTING MACHINES
PIPE CUTTING MACHINES
CORPORATION TAPPING MACHINES

another taste and odor problem solved by Mathieson Chlorine Dioxide!

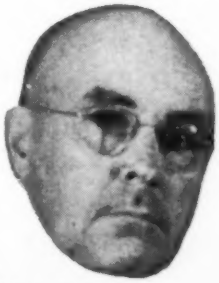


Major C. Hagar





Robert Mounsey



Prof. F. A. Russell

Water Superintendent Major C. Hagar of the City of Lawrence, Kansas, and his staff testify that the cost of Mathieson ClO_2 treatment is small considering its enthusiastic reception by consumers.

During January and February, 1946, melting snow and ice created especially unpleasant tastes and odors in the Kaw River, water supply for the City of Lawrence, Kansas. Yet, the Mathieson Chlorine—Chlorine Dioxide water treatment was able to cope with even that extreme condition.

Write Mathieson for details of this new technique. It's a development of interest to every water works superintendent. THE MATHIESON ALKALI WORKS (INC.), 60 E. 42nd St., New York 17, N. Y.

Chlorine Dioxide . . . Sanitation HTH . . . Liquid Chlorine
PH-Plus (Fused Alkali) . . . Caustic Soda . . . Soda Ash
Bicarbonate of Soda . . . Ammonia, Anhydrous & Aqua
Carbonic Gas . . . Dry Ice . . . Synthetic Salt Cake
Sodium Chlorite Products . . . Sodium Methylate

Mathieson
CHLORINE DIOXIDE

COST PER SERVICE YEAR

The long life of cast iron pipe is a matter of record. In 200 of America's largest cities, some or all of their original cast iron distribution mains are still in use, after 50 to 125 years of efficient service.

The low annual maintenance cost of cast iron pipe is also a matter of record. Official reports from 195 water works superintendents show conclusively that the annual maintenance cost of cast iron distribution mains is far below that of other pipe materials.

Since more than 95 per cent of the pipe in the water distribution systems of these cities is cast iron pipe, their operation is obviously economical.

Long life and low annual maintenance cost are the governing factors in the economical operation of a water distribution system. With both factors assured, as in cast iron pipe, a higher *first cost* is soon offset by a *low cost per service year*. And that is the cost that counts.

And, since underground mains represent the principal part of the cost of a water distribution system, the citizens and taxpayers of these cities obviously benefit from the long life and *efficient* life of cast iron pipe.

CAST IRON PIPE

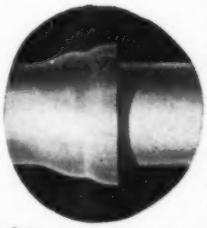
IS THE COST THAT COUNTS

By efficient life, we mean this:

> "Cast iron pipe not only offers a century or more of efficient life as a structure—it offers a century or more of efficient life as a carrier. In the limited areas with tuberculating waters, cement-lined cast iron pipe is tuberculation-proof and insures high carrying capacity for the life of the pipe. In the greatly predominating areas without tuberculating waters, the carrying capacity of unlined cast iron pipe remains practically unimpaired for the life of the pipe."

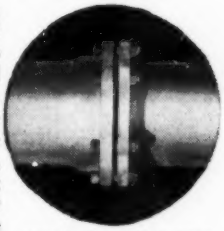
A long life, and an efficient one, has earned for cast iron pipe the right to be known as Public Tax Saver Number One. Saving money day-by-day in maintenance cost. Saving money from generation to generation by avoided replacements that would be necessary were shorter-lived pipe used.

Joints for Cast Iron Pipe



Bell-and-Spigot Joint: the standard joint for water and sewerage service.

A variety of joints are available, of which the two most widely used are illustrated. Special purpose joints, such as the Ball-and-Socket, or Flexible Joint for underwater use, and the Flanged Joint for above-ground use, are also available.



Mechanical Joint: bottle-tight and flexible, now with interchangeable parts.

PUBLIC WATER SUPPLY —the Forgotten Industry

The public takes piped running water for granted—until it's turned off. A good public water supply is never news—except on the rare occasion when something goes wrong. To help create public awareness of the service rendered by America's water supply systems, the Cast Iron Pipe Research Association is presenting little known facts about public water supply to the *six million* influential readers of "Time" and "Nation's Business." For example, the following illustration and excerpts from a current advertisement:

What's cheaper than dirt?

Pure running water from a public water supply system is literally cheaper than dirt. A ton of it (240 gallons) costs as low as 10 cents. A ton of earth, dumped in front of your home, would cost many times 10 cents for trucking alone. This low cost of pure water is the more remarkable when you consider it includes collection, purification *and delivery right to your faucet.*

Water supply service is generally "out of sight and out of mind" of the public, and, too often, taken for granted. But it is America's largest industry, operated with great efficiency, 24 hours a day, 365 days a year.

• • •

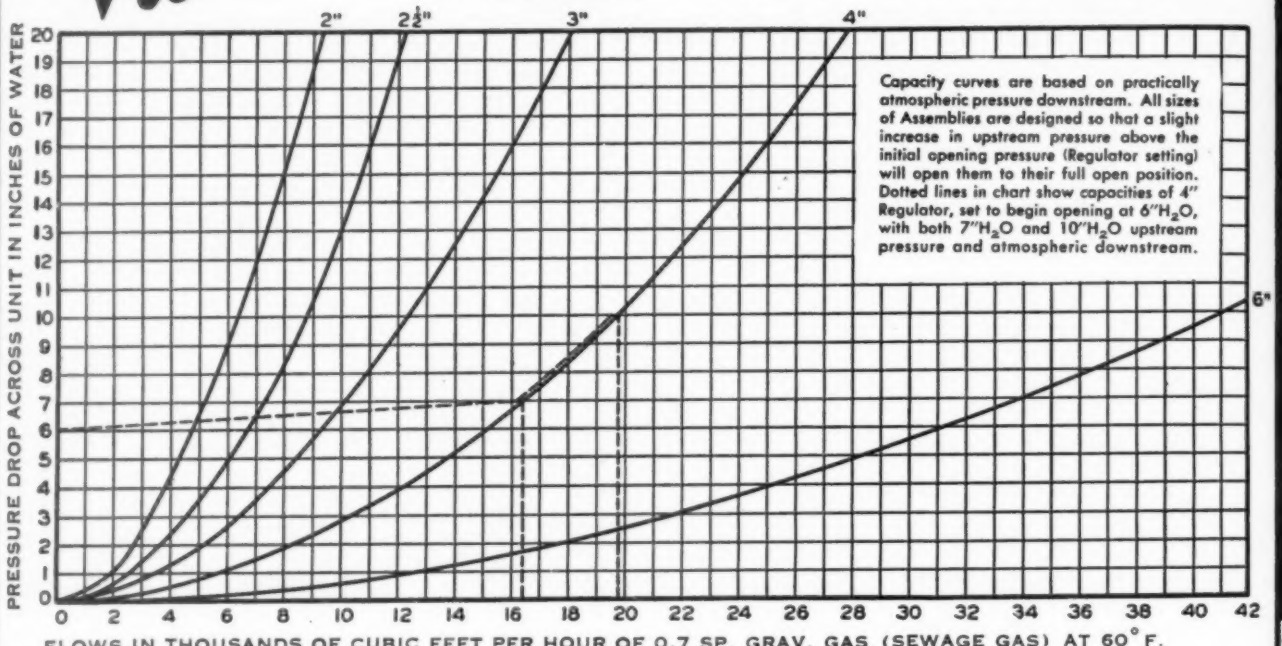
Among the reasons for the low cost of water are, of course, the long life and low annual maintenance cost of cast iron pipe.

Cast Iron Pipe Research Association, T. F. Wolfe, Research Engineer, Peoples Gas Bldg., Chicago 3.

SERVES FOR CENTURIES

SAFE SEWAGE GAS CONTROL

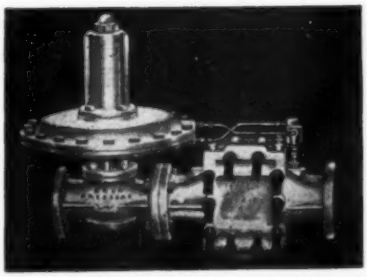
"Varec" PRESSURE RELIEF AND FLAME TRAP ASSEMBLY


PRESSURE DROP ACROSS UNIT IN INCHES OF WATER
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
2"
2½"
3"
4"
6"
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42
FLOWS IN THOUSANDS OF CUBIC FEET PER HOUR OF 0.7 SP. GRAV. GAS (SEWAGE GAS) AT 60° F.
Capacity curves are based on practically atmospheric pressure downstream. All sizes of Assemblies are designed so that a slight increase in upstream pressure above the initial opening pressure (Regulator setting) will open them to their full open position. Dotted lines in chart show capacities of 4" Regulator, set to begin opening at 6"H2O, with both 7"H2O and 10"H2O upstream pressure and atmospheric downstream.

THE PACE SETTER SINCE 1928

"VAREC" offers a simple, fool-proof unit—sensitively positive operation—a positive flame trap. The fusible element melts at 200°F. and stops gas flow within 15 seconds. The element is so designed that shut-off valve cannot possibly close unless contacted by flame. The new "VAREC" Sewage Gas Control Handbook S-3 is packed with information, illustrations, flow diagrams, charts and data of value to sanitation engineers. Write for your copy today.

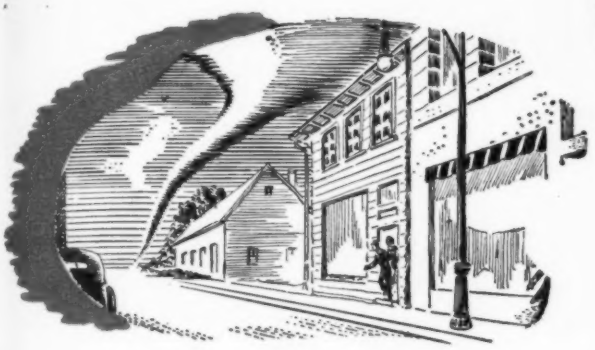
THE VAPOR RECOVERY SYSTEMS COMPANY
COMPTON, CALIFORNIA
NEW YORK CITY—CHICAGO, ILL.—HOUSTON, TEX.
Agencies Everywhere—Cable Address VAREC-COMPTON (All Codes)



This Unit consists of a diaphragm-operated Regulator. Flame Trap and Thermal Shut-Off Valve. It maintains a predetermined back pressure, passing surplus gas to the waste gas burner. It stops Flame Propagation. Patented extensible Flame Trap element simplifies inspection and maintenance. It is non-corrosive. Sizes 2" to 6".

Are you prepared

FOR THE BIG



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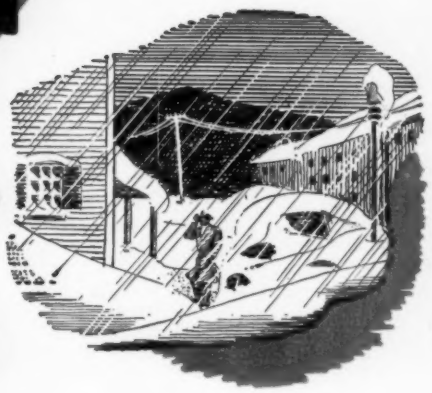

The possibility of explosion, flood, tornado, blizzard, many other emergencies constantly threatens the flow of safe water. That's why so many smart engineers maintain a supply of Per*chloro*n as a standby water treatment chemical. They know that Per*chloro*n has proved itself in every section of the country, by quickly and dependably safeguarding water supplies in a wide variety of emergencies.

Per*chloro*n serves other water treatment functions, too . . . sanitation of small water systems, new mains, wells, swimming pools. Its properties include the oxidation of ferrous iron in water, removal of hydrogen sulphide, control of most types of algae, and the destruction of chlorine-susceptible bacteria. Write us for full descriptive material.

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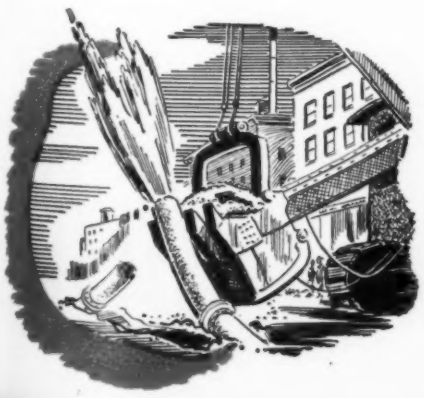
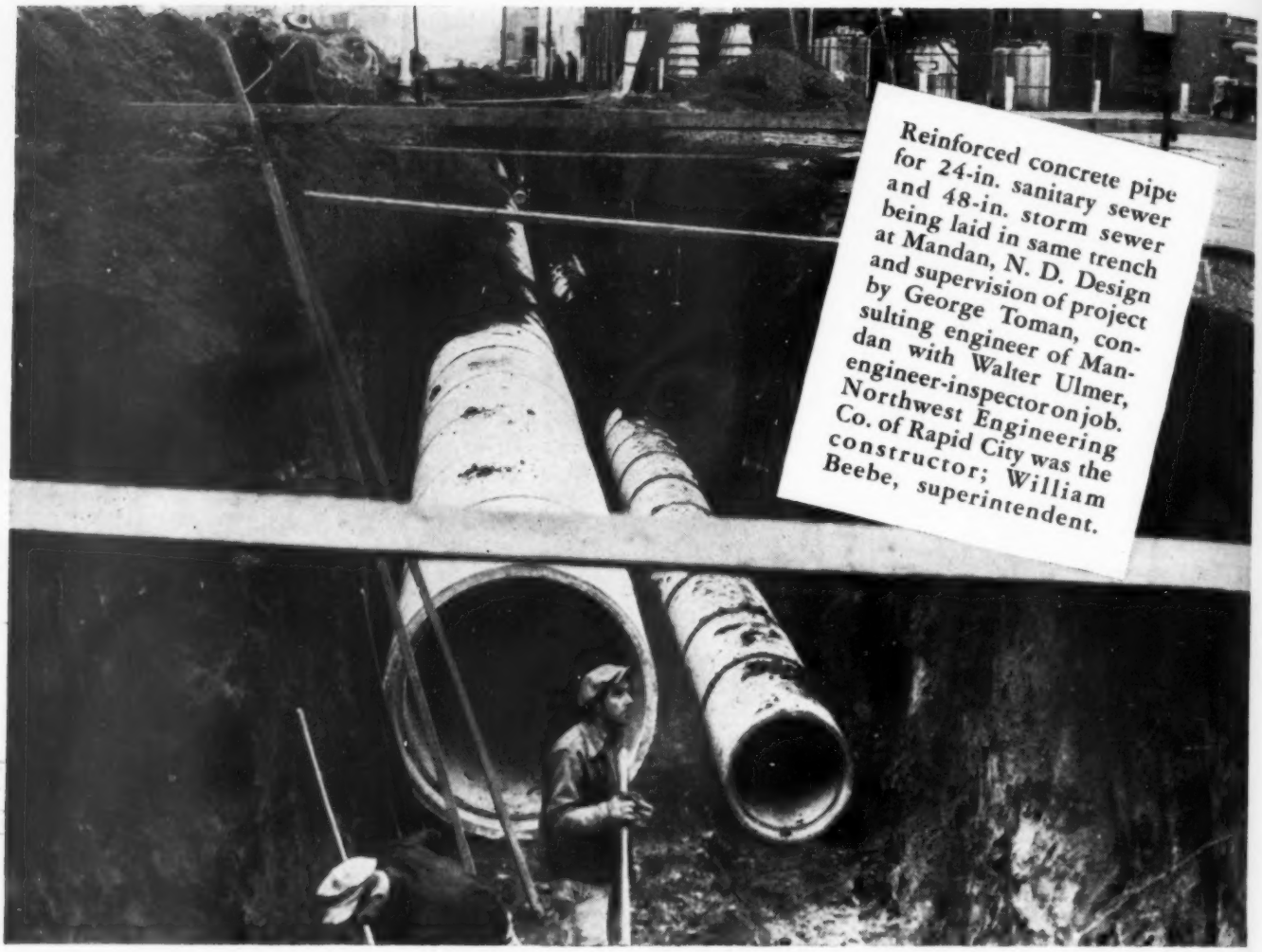


PENN SALT

Perchloron

REG. U. S. PAT. OFF.



Reinforced concrete pipe for 24-in. sanitary sewer and 48-in. storm sewer being laid in same trench at Mandan, N. D. Design and supervision of project by George Toman, consulting engineer of Mandan with Walter Ulmer, engineer-inspector on job. Northwest Engineering Co. of Rapid City was the constructor; William Beebe, superintendent.

Mandan, N. D. Builds for Future with *CONCRETE PIPE*

EXTENSIONS to the sanitary sewer facilities and storm drainage system of Mandan, N. D., completed with reinforced concrete pipe in 1946, prepares that city for future residential and industrial growth.

The use of concrete pipe assures the city of Mandan many years of efficient operation of its sewer and storm drainage systems at low annual cost because concrete pipe lines have:

AMPLE STRENGTH to resist the most severe conditions of load and impact;

MAXIMUM CARRYING CAPACITY is assured by clean, even joints and smooth texture of inside surface;

HIGH WEAR RESISTANCE to abrasion caused by suspended grit;

MINIMUM INFILTRATION AND LEAKAGE assured by tight joints and uniformly dense concrete.

In common with all concrete pipe made by our members, the pipe supplied for the Mandan project complies with standard specifications of the American Society for Testing Materials and the American Association of State Highway Officials.

Technical information on concrete pipe line construction will be gladly furnished by this Association or any of its members. (List of members on request.)

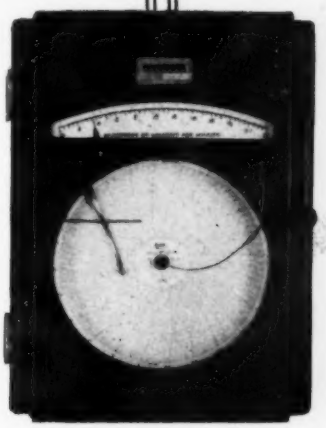
AMERICAN CONCRETE PIPE ASSOCIATION

228 NORTH LA SALLE STREET, CHICAGO 1, ILLINOIS

New! PARSHALL FLUME METER

RECORDS • INDICATES • TOTALIZES FLOW

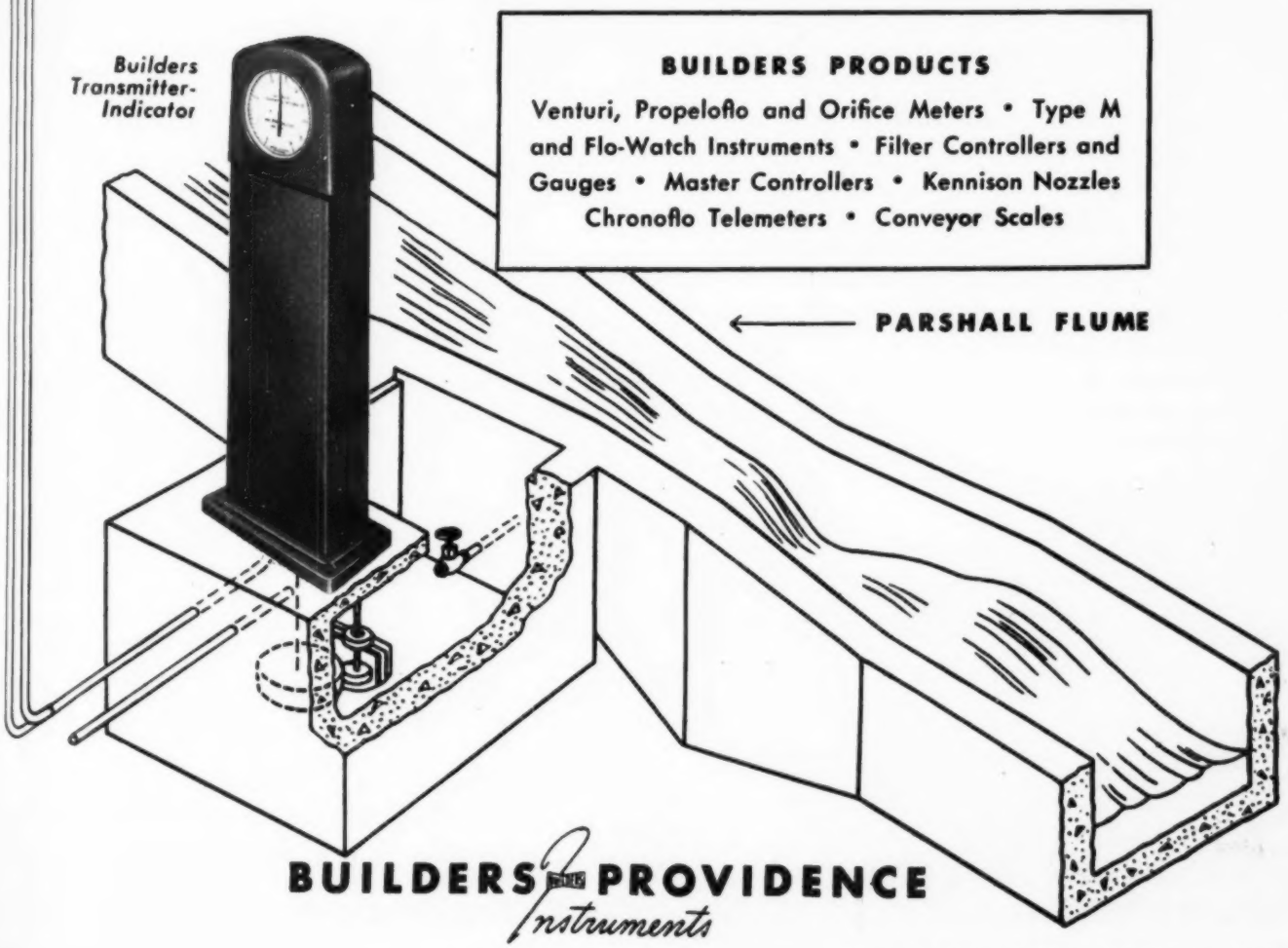
Over any distance



Builders Chronoflo Transmitter-Indicator is especially designed for metering raw sewage influent or sewage effluent with Parshall flume, weir or Kennison nozzle. No meter house is required: The rugged metal case fully protects the instrument against weather or tampering. Installation as shown requires a minimum of piping; the instrument is float-actuated and has a large, direct-reading indicator dial.

A Builders Chronoflo Receiver, remotely located in the main office or central building, records, indicates and totalizes the sewage flow: It operates by a simple two-wire circuit over any distance from the Chronoflo Transmitter. The totalizer reads directly, without odd multipliers, and graduations are uniform throughout the entire range. Gallons per day are recorded on a large 12" chart.

For further information and new data Bulletin C5-230.35, address Builders-Providence, Inc., (Division of Builders Iron Foundry), 10 Codding St., Providence 1, R. I.


Builders Transmitter-Indicator
BUILDERS PRODUCTS
Venturi, Propelofio and Orifice Meters • Type M and Flo-Watch Instruments • Filter Controllers and Gauges • Master Controllers • Kennison Nozzles Chronoflo Telemeters • Conveyor Scales
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VERTICAL TURBINE PUMPS
WATER-LUBRICATED:
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The "Big Store" is an American institution, where a man can get a better buy from a broader choice. That's why most buyers go to a Fairbanks-Morse-Pomona dealer for their vertical turbine pumps.
They know that these dealers are not restricted in their recommendations. They know that they'll get impartial help in buying the right pump.
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instinctive guidance...

SINCE EARLY TIMES, the raven has been celebrated in parable and legend by men of the sea for its remarkable instinctive faculty for flying directly toward the nearest land. Similarly, an instinct for direction often serves in the development of industrial enterprise, guiding with certainty and confidence toward the achievement of set goals. Pioneering in the development of the electro-chemical industry in America, Niagara products and services have been built upon a sure sense of the need by industry for basic electro-chemical products. Niagara Alkali Company has continued to advance the means and methods of producing these basic chemicals for industry to the highest quality standards. That is why Niagara can be relied upon to deliver consistently high-quality products at all times. Niagara Alkali Company, 60 East 42nd Street, New York 17, N. Y.

THE PIONEER CREED

Always New, Always Better

Since the turn of the century Niagara has pioneered basic electro-chemical development in this country. This experience is reflected not only in Niagara product quality but also in the efficiency of the service Niagara extends to customers seeking to blaze new trails to product improvement.

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CAUSTIC POTASH • CAUSTIC SODA
CARBONATE OF POTASH

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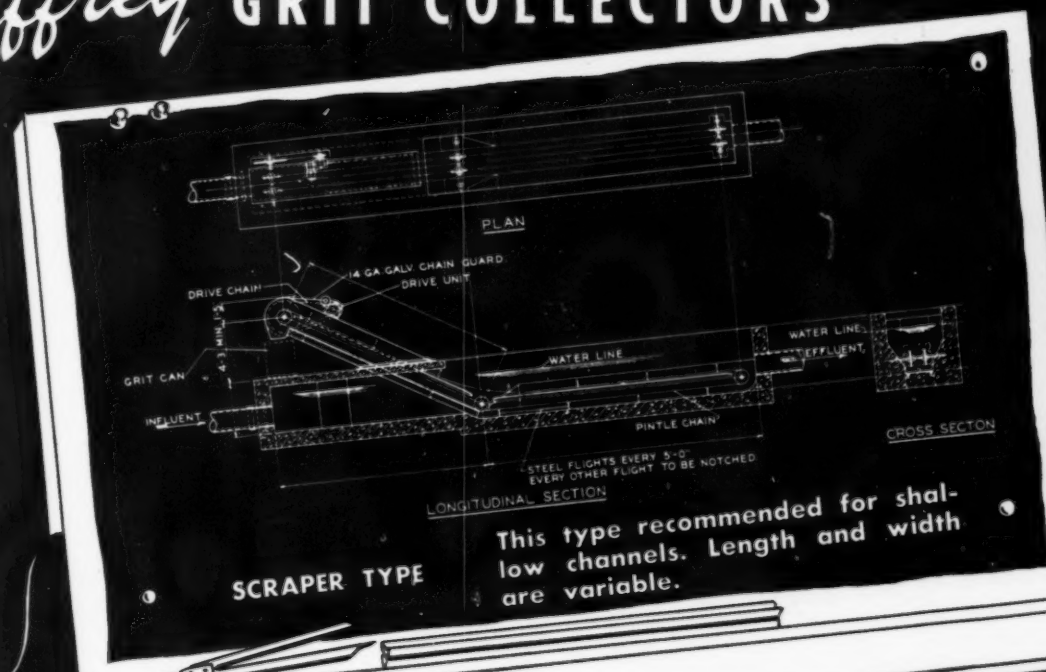
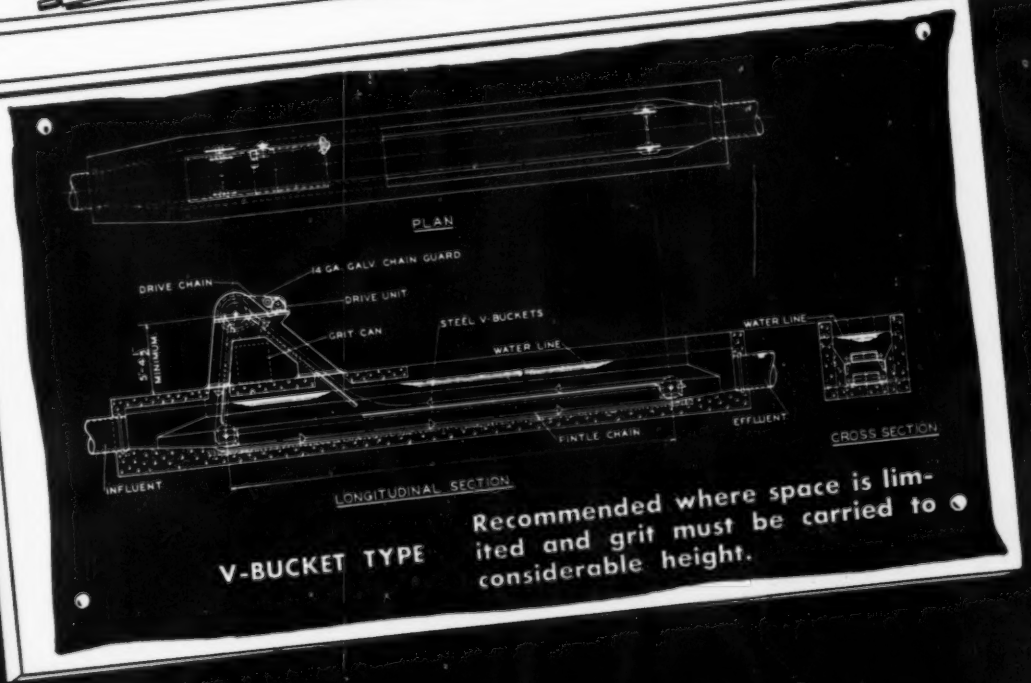
Jeffrey GRIT COLLECTORS



SCRAPER TYPE This type recommended for shallow channels. Length and width are variable.



V-BUCKET TYPE Recommended where space is limited and grit must be carried to considerable height.

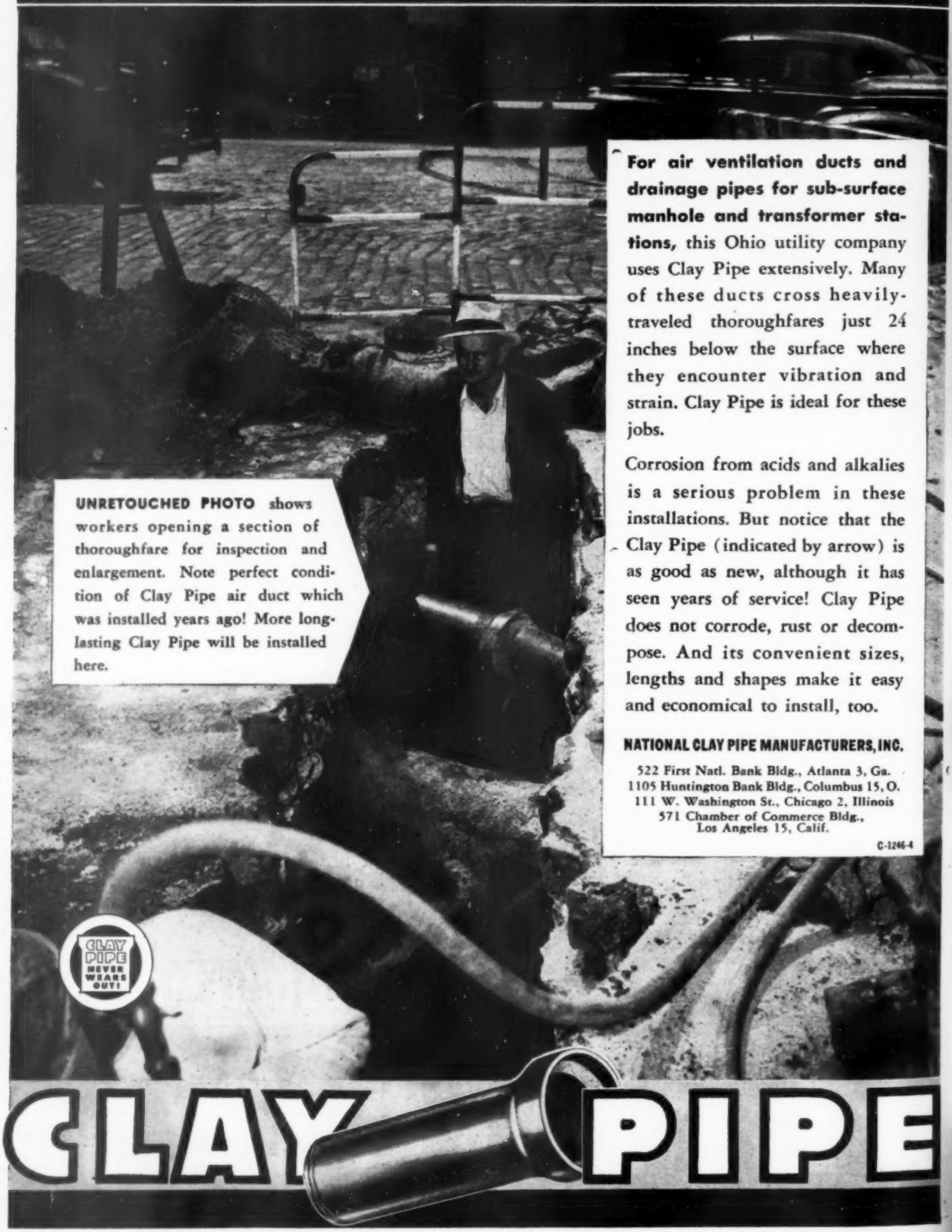
PLANNED TO MEET REQUIREMENTS

JEFFREY

ESTABLISHED 1877

CLAY PIPE

WITHSTANDS CORROSION – VIBRATION



UNRETOUCHED PHOTO shows workers opening a section of thoroughfare for inspection and enlargement. Note perfect condition of Clay Pipe air duct which was installed years ago! More long-lasting Clay Pipe will be installed here.

For air ventilation ducts and drainage pipes for sub-surface manhole and transformer stations, this Ohio utility company uses Clay Pipe extensively. Many of these ducts cross heavily-traveled thoroughfares just 24 inches below the surface where they encounter vibration and strain. Clay Pipe is ideal for these jobs.

Corrosion from acids and alkalies is a serious problem in these installations. But notice that the Clay Pipe (indicated by arrow) is as good as new, although it has seen years of service! Clay Pipe does not corrode, rust or decompose. And its convenient sizes, lengths and shapes make it easy and economical to install, too.

NATIONAL CLAY PIPE MANUFACTURERS, INC.

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1105 Huntington Bank Bldg., Columbus 15, O.
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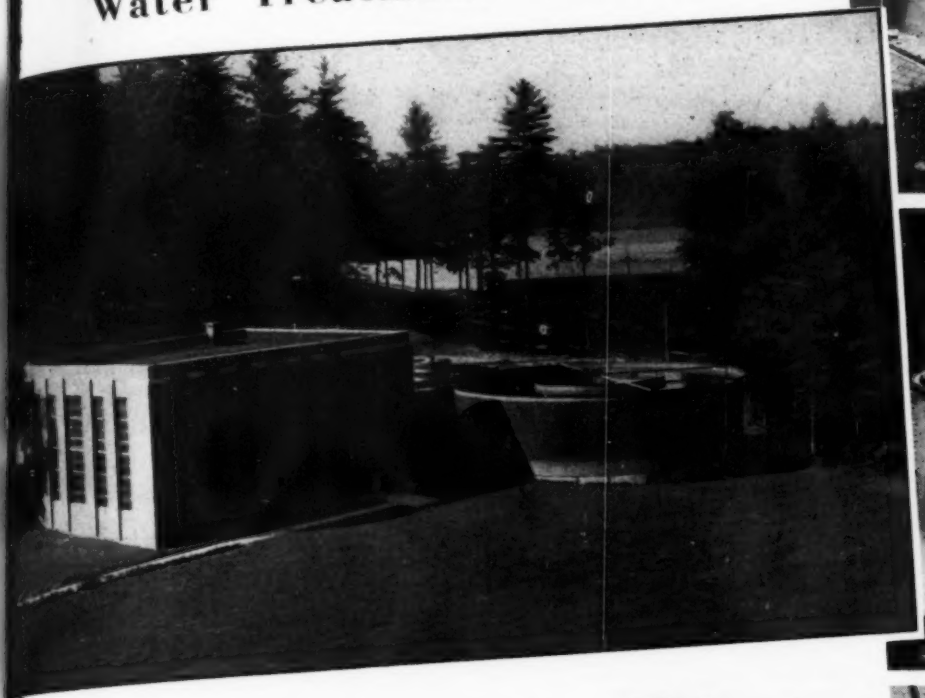
571 Chamber of Commerce Bldg., Los Angeles 15, Calif.

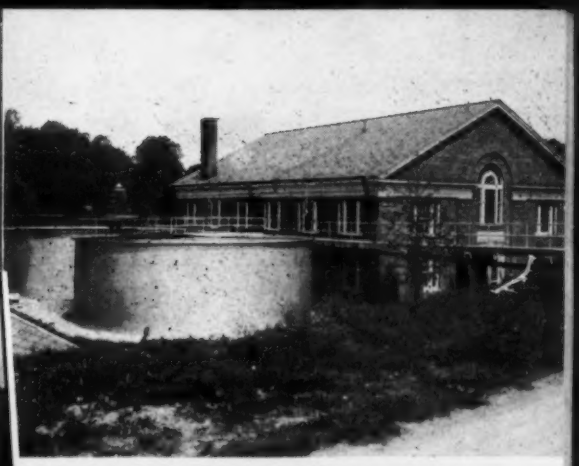
C-1246-4

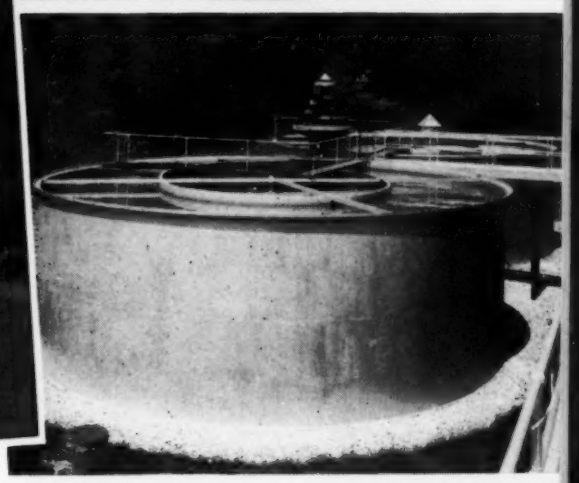
CLAY PIPE NEVER WEARS OUT!

CLAY PIPE

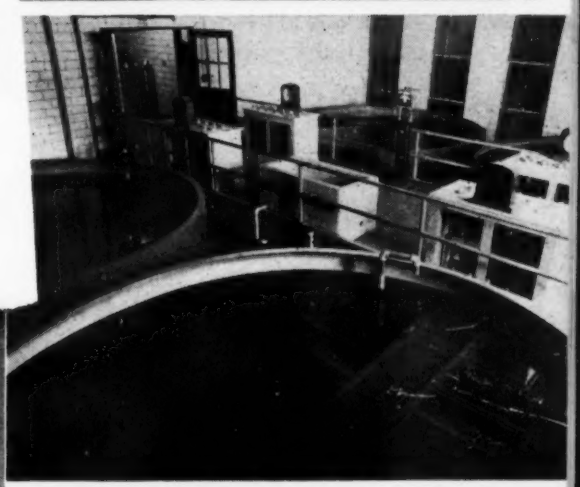
A permanent investment in efficient, economical Water Treatment Facilities

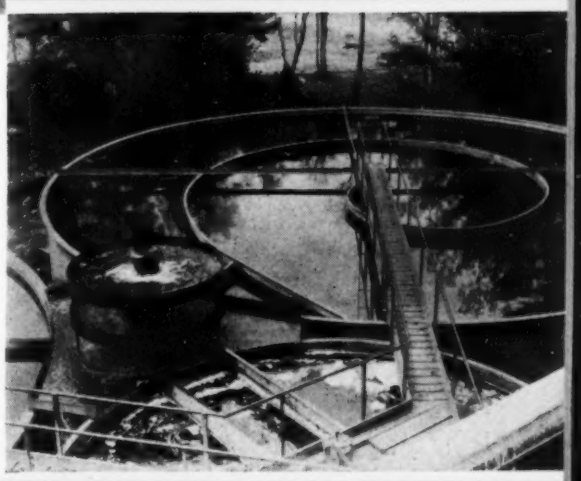






Steel Filtration Plants
by
Pittsburgh-Des Moines





The permanence of steel, employed for all water-handling equipment from intake point to elevated storage tanks, reservoirs or standpipes, is a modern advantage provided by Pittsburgh-Des Moines Filtration Plant design and fabrication.

We will be glad to consult with you on your water treatment project, and show you in detail the many features contributing to better performance and economy in P-DM Steel Filtration Plants. Write today, without obligation.

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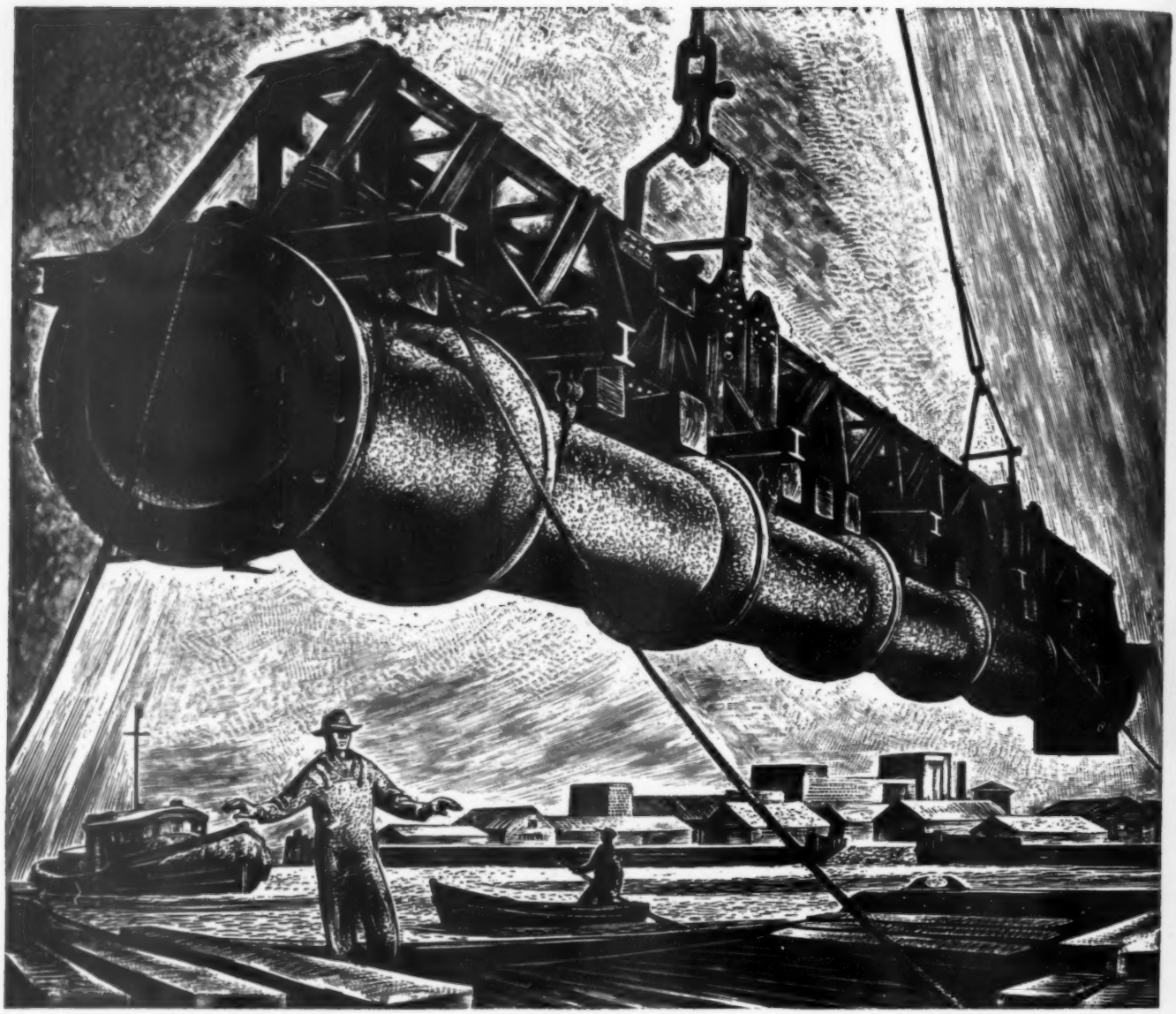

Original Woodcut by Lynd Ward

U. S. Cast Iron Pipe is and has been widely used for river-crossing and other underwater installations. Ruggedness of design, effective resistance to corrosion and flexibility of the available joints, enable cast iron pipe to meet the exacting requirements of both installation methods and underwater service. We are in a position to draw upon a considerable fund of information acquired from many years of experience if suggestions are desired in connection with planning such installations.

U.S. cast iron PIPE

U. S. PIPE & FOUNDRY CO.
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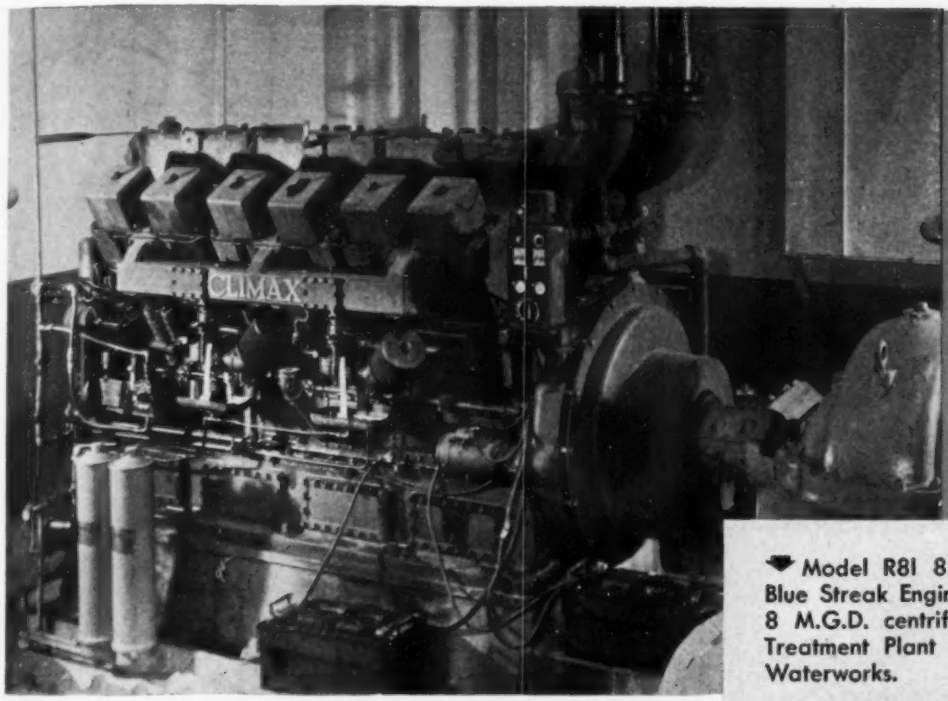
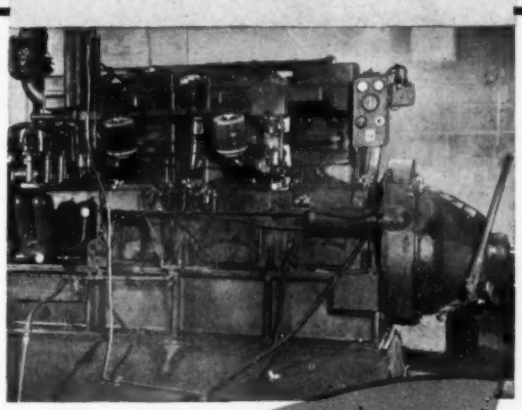
INSTANT DEPENDABLE LOW-COST POWER for Standby Service!



NOTE: In continuous service Climax Engines have established records of as high as 60,000 hours without major overhaul on pumping operations (data available on request).

Wilmington, N. C. Waterworks adds to its Climax standby equipment at King's Bluff Pumping Station new Model V-495, 12 cylinder, 7x7, Climax Blue Streak Engine direct connected to 5600 G.P.M. centrifugal pump.

Model R8I 8 cylinder 6x7 Climax Blue Streak Engine direct connected to 8 M.G.D. centrifugal pump in Water Treatment Plant of Wilmington, N. C. Waterworks.



IN WATERWORKS from coast to coast (as well as in stations of waterways and dams) Climax Engines are increasingly specified by engineers, not only for their dependable value during purchased power outages—but as an aid in keeping down maximum demand charges during unusual or unexpected periods of peak water demand.

Their reliability has been a factor in giving municipalities a low insurance rating by the National Board of Underwriters.

Climax Engines for standby service are 4, 6, 8 and 12 cylinder, 4 cycle types, rated from 40 to 495 horsepower. They operate on gasoline, butane, by-product or natural gas. Climax Generating Sets are from 5 kw to 312 kw.

For complete information, bulletins or engineering consultation, write Climax Engineering Division, Climax Industries, Inc., Clinton, Iowa.

WRITE FOR BULLETIN on New, Compact, Heavy Duty Climax V8 Engine (330 h.p. at 1200 r.p.m.). A powerful, instant-starting, smooth-running, flexible prime mover that occupies unusually small space.

climax BLUE STREAK ENGINE

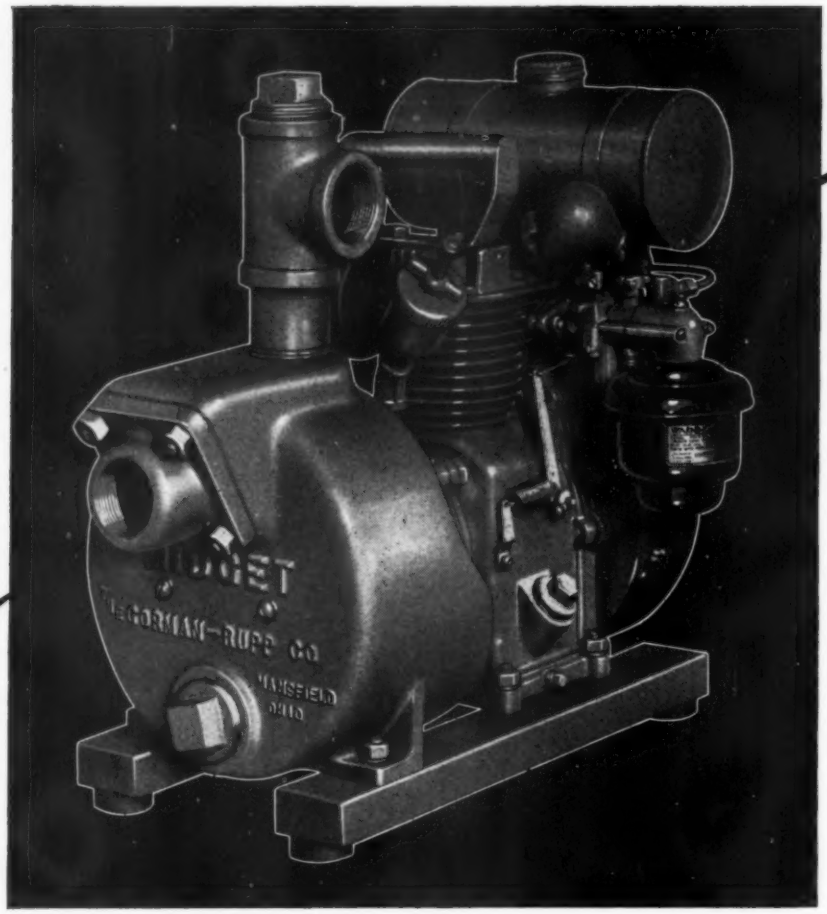
Builder of Climax DIESELS and GENERATING SETS

CLIMAX INDUSTRIES INC.

PUMPS MORE WATER

per pound of pump

and at Less Cost of Operation



The Gorman-Rupp "Midget" pump will handle 3000 gallons per hour, 400 times its own weight in water every hour at average heads. It is easily carried from one job to another as it weighs only 60 pounds.

Not only will the "Midget" handle more water per pound of pump but will do it at less cost in power, fuel and maintenance. It is not uncommon for a Gorman-Rupp pump to run 60 days or more without interruption. It is the simplest centrifugal pump built – rugged, reliable, efficient. It is automatic self-priming and non-clogging – any muck or solids that will pass the intake strainer will clear the pump with no damage to the mechanism.

There is a size of Gorman-Rupp self-priming centrifugal pump to handle any pumping problem. Other models will handle capacities up to 125,000 gallons per hour.

Ask our nearest distributor for a Gorman-Rupp pump. Try it on the job. If it doesn't do a better job than any pump you have seen, return it at our expense.

Originators in 1936 of the Famous Blue Pump that others now imitate.

THE GORMAN-RUPP COMPANY

Gorman-Rupp Pumps — Unsurpassed for Pumping Fast

327 Bowman Street **Mansfield, Ohio**

CALGON* works wonders with water...

threshold treatment with CALGON

. . . controls corrosion
in filters, mains, meters and service lines, even with water having pH values as low as 5.2.

. . . inhibits scale formation
in filters, mains, meters, service lines and hot water heaters, although hardness may be as high as 82 grains, and water temperature as high as 220° F.

. . . eliminates red water
though as many as 8 ppm of dissolved iron or manganese may be present.

. . . stabilizes water following lime softening
preventing after-precipitation of calcium carbonate on the filter sand, in mains, meters or service lines, although water may have a pH value as high as 11.0, and although the softened water is later mixed with water having excess alkalinity.

We will be glad to send you full information about Calgon and the advantages it offers in the treatment of your own supply.

*T. M. Reg. U.S. Pat. Off.

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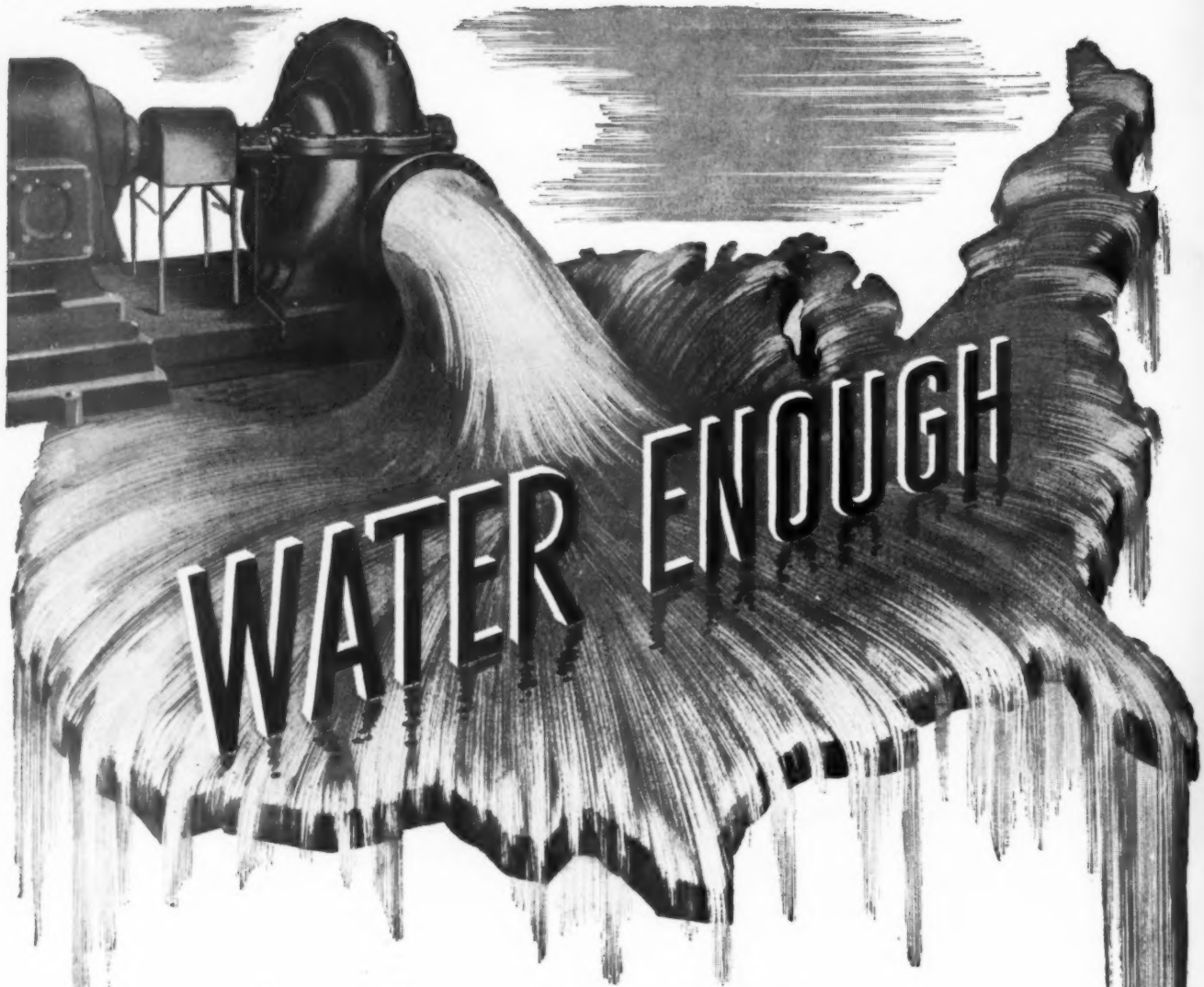

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for the entire U.S.A.

SUPPLIED BY DE LAVAL PUMPS

De Laval centrifugal water works pumps built to date have a total capacity of approximately 20 billion gallons daily—more than enough to supply all water requirements of the entire population of the United States. The City of Chicago, alone, is served by De Laval pumps having a total capacity of over one billion gallons daily; St. Louis, six hundred million; Cleveland, seven hundred million; Philadelphia, three hundred million; and so on down the list. In fact, 78% of all American cities of over 100,000 population are served by De Laval water works pumps.

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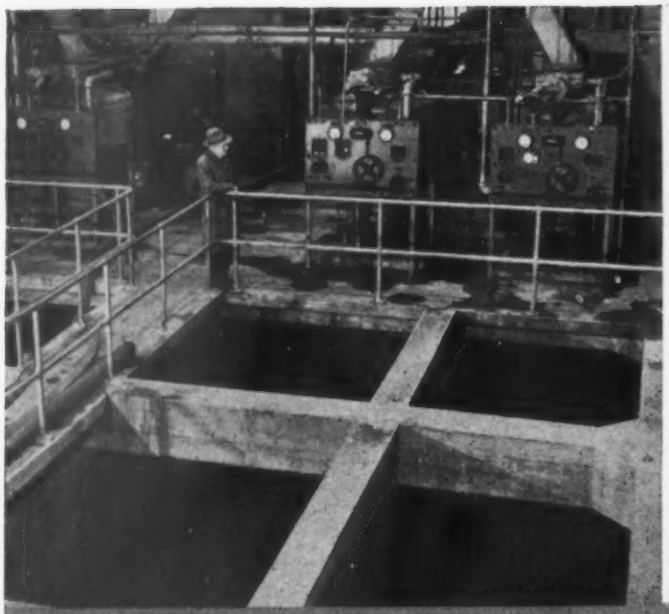
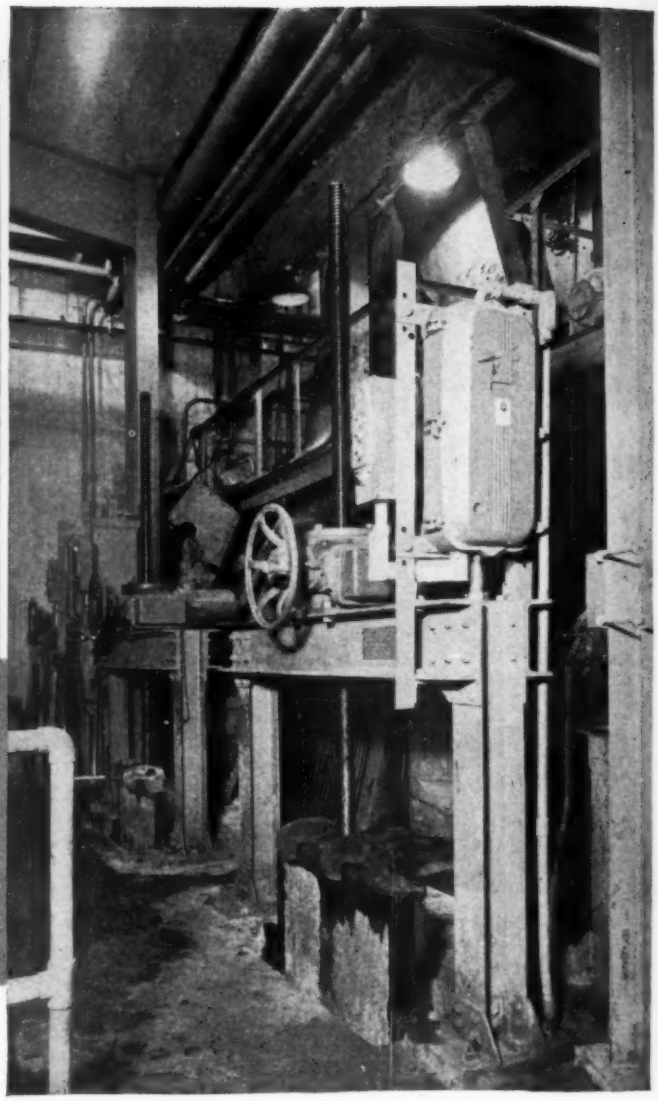


Where Everdur Serves in New Jamaica Plant...

In 5 hydraulic sluice gates: Bolts, facing strips and other mounting parts. Also copper-silicon alloy 4¼ inch diameter operating stem.

In two inclined 20-foot diameter revolving disc screens: Slotted Everdur plates for cone and disc.

In four grit ejectors: Everdur for gate slides and cylinders, piston rods, valve stems, bolts and nuts.



Everdur provides long life for Jamaica's Grit Ejectors

FOUR GRIT EJECTORS of 40 cu. ft. capacity each, with 12-inch inlet and 8-inch discharge slide gates, are in continuous service at the Jamaica Sewage Treatment Plant of the City of New York.

All gate slides and cylinders, piston rods, valve stems, operating gear, bolts and nuts are of Everdur*. These copper-silicon alloys of The American Brass Company were selected by Krajewski-Pesant Mfg. Corporation, designers and fabricators of the equipment, because of the high strength, workability and weldability of these alloys, and their high resistance to many types of corrosive gases and liquids.

For detailed information on Everdur Copper-Silicon Alloys in sewage and water works service, write for Publications E-11 and E-5.

*Reg. U. S. Pat. Off. 48319

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THE AMERICAN BRASS COMPANY

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Subsidiary of Anaconda Copper Mining Company

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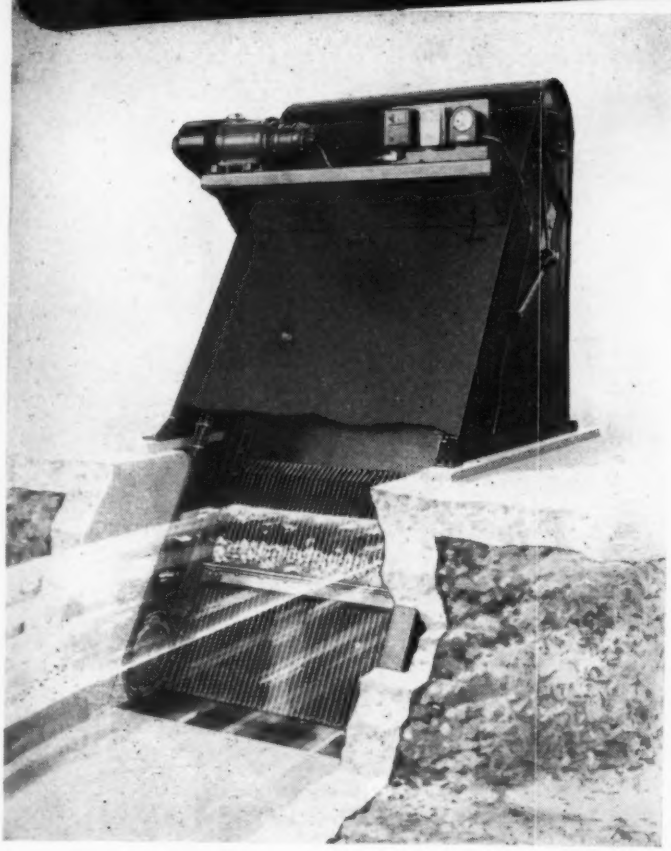
For economical, efficient removal of screenings . . .



from 0.5 to 150 MGD

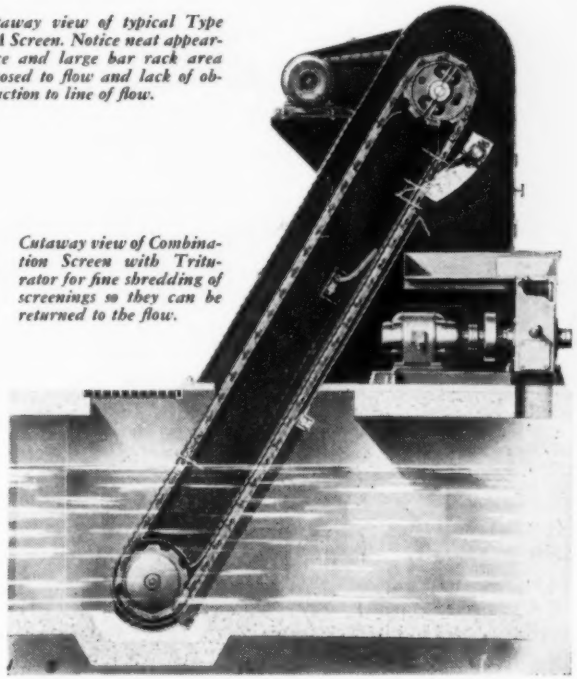
Rex Mechanically Cleaned Bar Screens assure efficient, low-cost removal of debris for virtually any range of flow or channel dimension. They are easily installed in new or existing channels and have remarkably low head loss.

These rugged screens have a number of exclusive design features that have made them the top choice for the majority of installations.

For all the facts and for application assistance, write Chain Belt Company, 1610 W. Bruce St., Milwaukee 4, Wis.

Cutaway view of typical Type MA Screen. Notice neat appearance and large bar rack area exposed to flow and lack of obstruction to line of flow.

Cutaway view of Combination Screen with Triturator for fine shredding of screenings so they can be returned to the flow.



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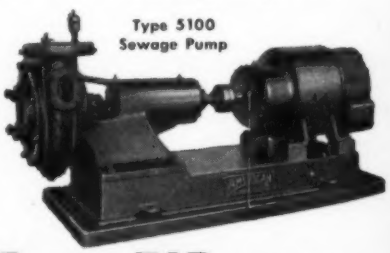

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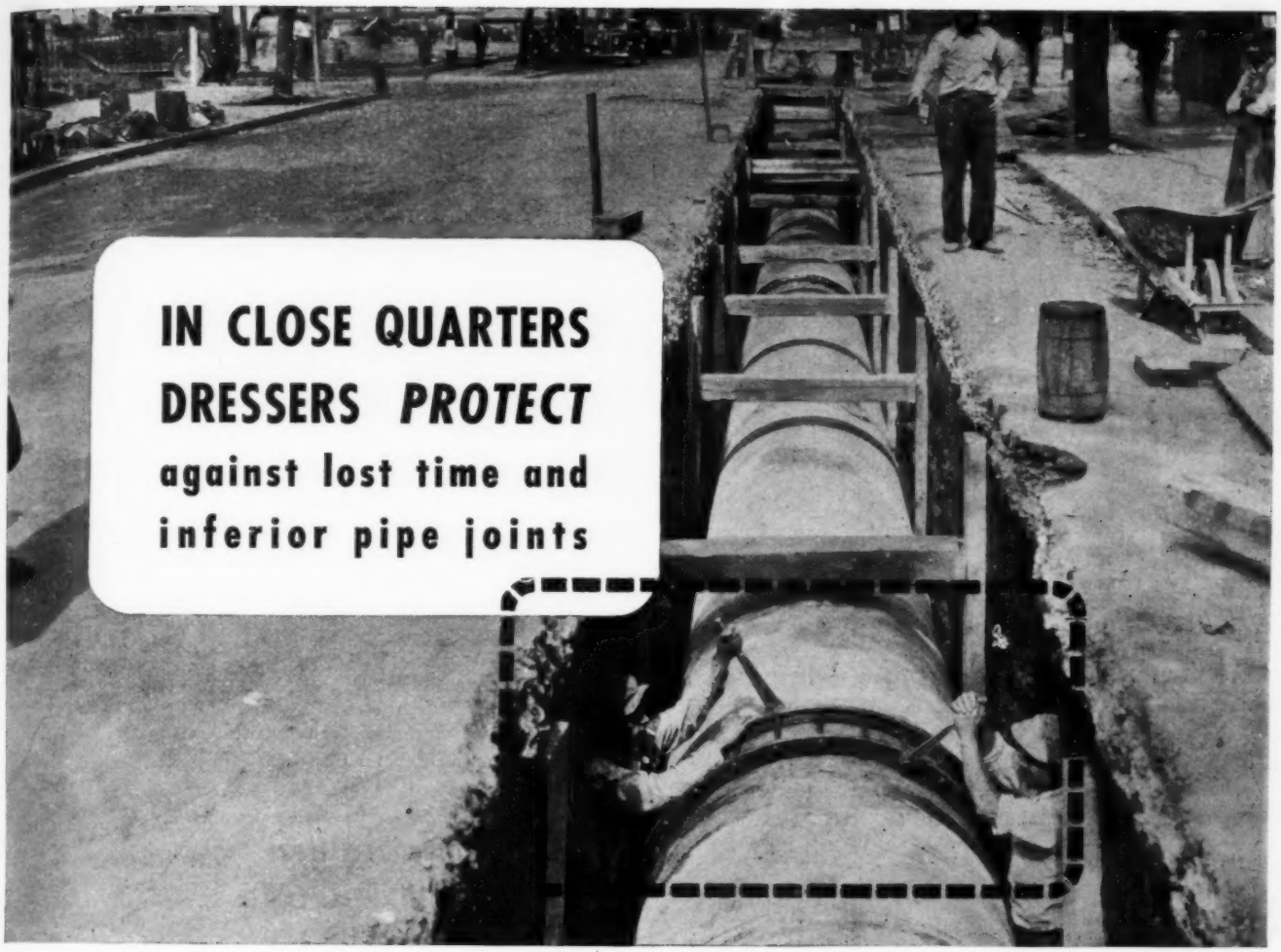

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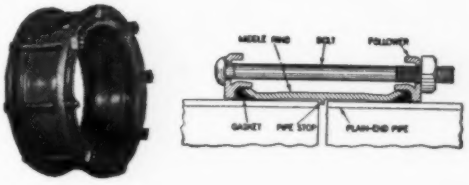

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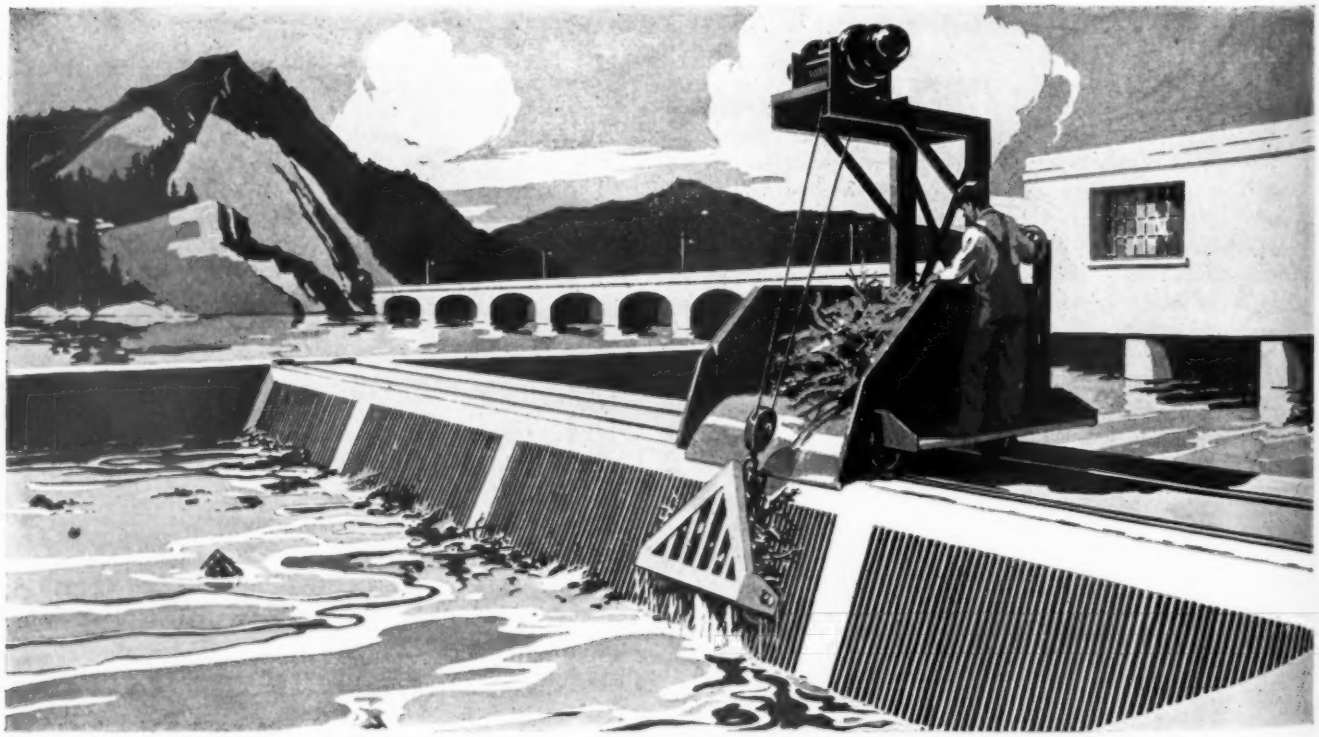

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Operation of Well Supplies

Must receive more than passing attention if we are to preserve our ground water resources. Proper attention to operating records, measurements of static level, drawdown and recovery, as well as sound maintenance and repair program, are essential to good well operation. Many valuable pointers in the maintenance and operation of wells are given by—

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Gilbert Associates, Inc., Reading, Pa.

The Construction of Sewers

Relates experiences with various methods of stabilizing gravity sewers or drainage lines, with particular emphasis on proper foundations and use of so-called dwarf or saddle piling, which is effectively described and illustrated. The question of jointing of pipes is dealt with in some detail, and results from the various types of joints are cited. The contributor of this article is an engineer of wide experience in pipe line construction—

M. W. LOVING,
Consulting Engineer, Chicago, Ill.

Treatment and Control Methods for Industrial Wastes

Constitute a case history of methods for the treatment of a variety of industrial wastes in Michigan and results therefrom, as revealed by—

L. F. OEMING, Engineer,
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Is a continuing series of articles by Prof. R. W. Angus of Toronto, for many years a teacher of hydraulics and consulting engineer. One of the series appears in this issue, with others to follow.

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WATER & SEWAGE WORKS

VOL. 94, No. 2 FEBRUARY, 1947

A Gillette Publication

DEVELOPMENTS OF 1946 IN SEWAGE AND INDUSTRIAL WASTE TREATMENT

A Critical Review

By

FRANCIS S. FRIEL

President

ALBRIGHT & FRIEL ENG'RS

PHILADELPHIA, PA.

President, Federation of Sewage Works Ass'ns.

The Author

THE year of 1946 was a period of reconversion and readjustment following World War II. Civilian activities which had been curtailed during the war began to adjust themselves. There has been a general expansion in new manufacturing plants, and also in residential construction. New construction in the sanitary field, however, has been at a standstill. A program of engineering planning for sewage and industrial waste treatment facilities has taken a definite forward stride. Many municipalities and industries are engaged in an extensive program covering the preparation of engineering plans for future installations. Federal Works Agency reports that plans are complete for $3,200,000,000 worth of State and local public works.

The construction of sewage and industrial waste treatment works has been delayed principally by (1) high construction costs; (2) the lack of availability of construction materials and equipment; (3) the scarcity of skilled labor and the demand for higher wages; (4) the uncertainty of labor production under present conditions; (5) the expectation of lower construction costs in the future; and (6) in the case of some municipalities, the expectation of Federal or State aid.

The accelerated program in the development of plans for sewage and industrial waste treatment works has a well founded background. Legislation has been enacted in many states requiring the construction of treatment facilities as a part of an aggressive movement for reducing stream pollution. Sanitary improvements which have been needed for many years were deferred before the war because of the economical conditions, and they were further curtailed during the war period because of the priorities established by the Government. The pollution of waterways with industrial wastes is now being acknowledged as a responsibility of industry. Industry has become more conscious of the part it must play in reducing stream pollution.

Research studies by many groups of technicians, both in private and in public service, have contributed much to the stream clean-up program. Development by water and sewage equipment manufacturers has played an important role in current progress. The contribution of the Sub-committee on Sewage Treatment of the National Research Council, Washington, D. C. (*Sewage Works Journal*, Sept., 1946) is a comprehensive report covering sewage treatment at military installations. The report contains voluminous statistical and descriptive data and a critical review of design and operation. A study of this report is recommended to those who are engaged in the design of sewers and sewage treatment works, and also to plant operators.

Other publications of 1946 worthy of study include: (1) "Utilization of Sewage Sludge for Fertilizer" (Manual No. 2, Fed. Sew. Wks. Assns.); (2) "Critical Review of Literature of 1945 on Sewage and Waste Treatment and Stream Pollution" (*Sew. Wks. Jour.*, Mar., 1946), and (3) Report on the Procedure for Handling of Industrial waste (*Sew. Wks. Jour.*, May, 1946).

New Construction

In the field of new construction in 1946 progress was made in only three major cities: Boston, Mass., Nut Island Sewage Plant with a capacity of 250 mgd.; the City of Toronto with its new Ashbridge's Bay Treatment Works to clean up the Lake front; and Baltimore, Md., with a program of converting old low rate filters to high rate units, and other major extensions to its sewage plant. Although construction was at a minimum, a survey by *Sewage Works Engineering* has revealed that in 24 states, representing 42 per cent of the population of the United States, 638 plants require repairs, enlargement, and modernization.

Federation of Sewage Works Associations

The growth of the Federation has been gratifying in that the membership and the financial strength have

advanced in extraordinary fashion. At the end of 1946 the membership was 3,703. The Federation now comprises 25 member associations in the United States, one in Canada, two in England and one in South America. At least three more units are now in the process of formation and the ground work has been laid for the affiliation of others.

The Federation has issued a "Safety Manual" and also one on "The Utilization of Sludge as a Fertilizer." Additional manuals are now being prepared on the "Chlorination of Sewage," "The Utilization of Units," "Trickling Filters," "Air Diffusion and Sewage Treatment," "Sewer Ordinances," "Sewer Maintenance," "Sewage Works Accounting," "Formation and Operation of Sanitary Districts," and "Paints and Protective Coatings for Sewage Works."

As the year ends an effort is being made to develop a special research project for Federation sponsorship under the program of the National Institute of Health. This project would involve a comprehensive survey of the limits of accuracy of present sewage and industrial wastes analytical methods.

A significant trend toward the recognition of industrial waste problems has taken place in the Federation. Time has been allocated on the programs of the Federation and its member associations for this subject, and the "Journal" has also carried an impressive number of articles dealing with this important problem. A special Industrial Waste Committee has been established in the Federation and the newest member association in the Federation emphasizes the trend by adopting the name Sewage and Industrial Wastes Association.

The Federation meeting held in Toronto last October was the largest on record with a registration of 810. Conventions are scheduled for San Francisco in 1947, for Detroit in 1948 and for Boston in 1949.

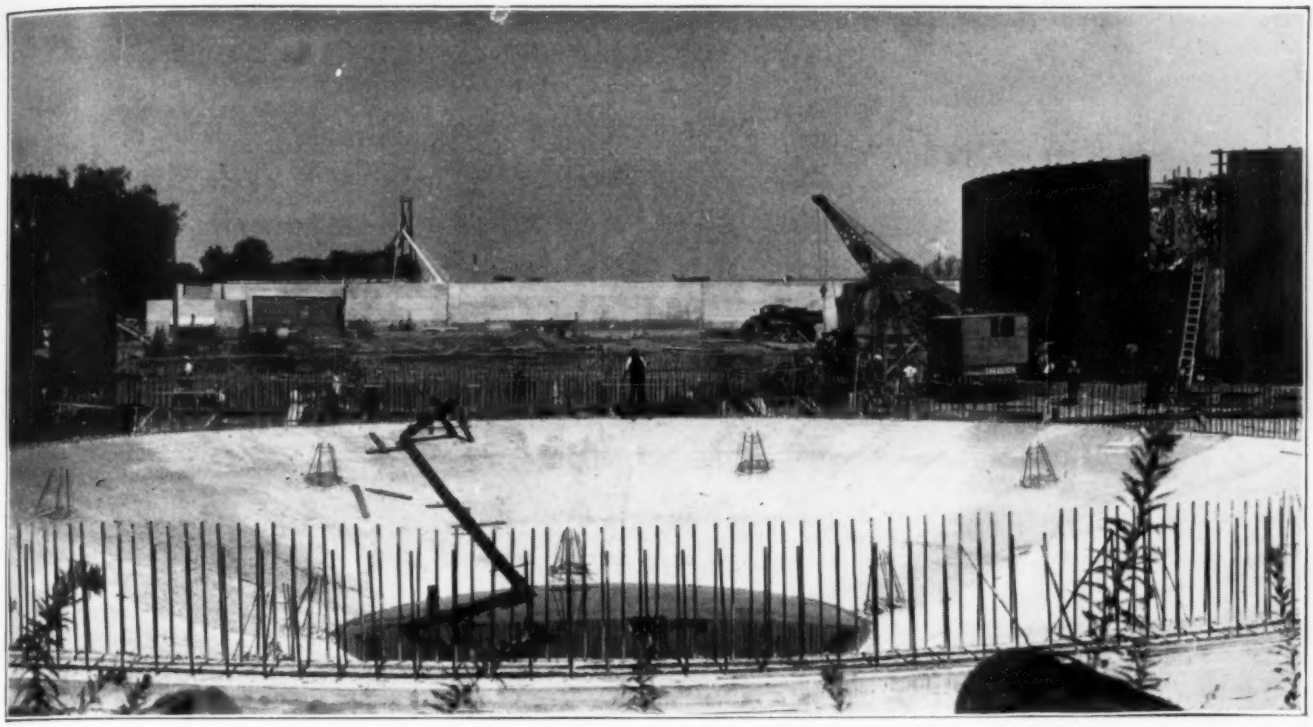
The Federation has grown in many ways and has assumed a position of real importance as a Professional Society representing industrial waste and sewage works technicians.

Finance

At the Toronto meeting of the Federation, the writer reviewed problems involved in financing sewage systems and treatment facilities. The following paragraphs briefly summarize that review: Methods of financing have been developed in recent years, and the free use of these newer methods has resulted in pollution abatement activities. Financing by the issuance of general obligation bonds or securities to be redeemed by special assessments is being supplanted in some instances by "authorities" or "sanitary districts," which issue bonds supported by the revenue derived from operation, with charges or sewer rentals being levied against individual property owners for the service rendered. This type of security, which may be termed a "non-debt revenue bond," is excluded from the legal debt limit of a municipality.

Financing by non-debt revenue bonds, now employed in at least 35 states, was upheld in the Miami, Fla., Sewer Rental Case in July, 1946. The Supreme Court of Pennsylvania has sustained the right of Philadelphia to impose sewage charges founded on water use. Sewer rentals, based on water consumption, flat rates and on several other methods, are now widely used throughout the country. A new formula for computing charges for handling industrial waste based on analyses was described in 1946 by S. R. Wright. This formula was a variation of the first formula of this type developed at Buffalo, N. Y., in 1943 by George E. Symons and F. W. Crane. The combination of other utilities and sewage under one operating head with the

1946 Progress in Industrial Waste Treatment Exemplified
At Terre Haute, Ind., is one of the pilot plants of the Council for Stream Improvement, sponsored and financed by the pulp, paper and paperboard industry of America.



Unusual Sight in 1946—Sewage Plant Under Construction

The new Ashbridge's Bay Treatment Works of Toronto is to be a $15,000,000 project, including outfall. Treatment will initially consist of efficient clarification and chlorination. Secondary treatment will follow if and when the need is proven, plans having been drawn to facilitate future developments as economy and technical considerations dictate.

limited use of the utility funds for sewage purposes is a procedure which has been employed.

Interest rates on municipal bonds between May, 1933, and February, 1946, dropped from 5.69 per cent to 1.29 per cent ("Bond Buyers Index"), but rose to 1.85 per cent by the end of 1946.

From 1933 to September, 1946, construction costs increased 111.6 per cent (E. N. R. Index), whereas the increase in the cost of carrying 30 year bonds during the same period was only 32.6 per cent. Between 1940 and September, 1946, construction costs increased 49 per cent, while during the same period the amortization cost on 30 year bonds increased 43.6 per cent. (As of December 31, 1946, construction cost had increased 115 per cent over 1933 and 52 per cent over 1940.)

The issuance of revenue bonds and the establishment of sanitary districts, commissions or authorities are today's trends, and sewage projects embracing watershed areas and disregarding political boundaries are gaining in popularity.

Screenings

In both large and small plants there appears to be a trend toward the destruction of screenings by some type of grinding which permits the ground material to enter the plant with the sewage. In some cases this practice has resulted in improvement in the precipitation of solids in primary tanks, while in other instances difficulty has been reported in the handling of heavier sludge. The operation of comminutors in a large number of plants has proved effective in saving labor for cleaning, transporting, and burying screenings, for eliminating odor problems associated with screenings and also for eliminating clogging of check valves and pumps.

At Niagara Falls, N. Y., the incineration of wet screenings from fine screens produced objectionable odors, due to the drafts in the incinerators not being arranged to subject the exhaust gases to the high temperatures necessary to destroy organic odors.

Grit Chambers

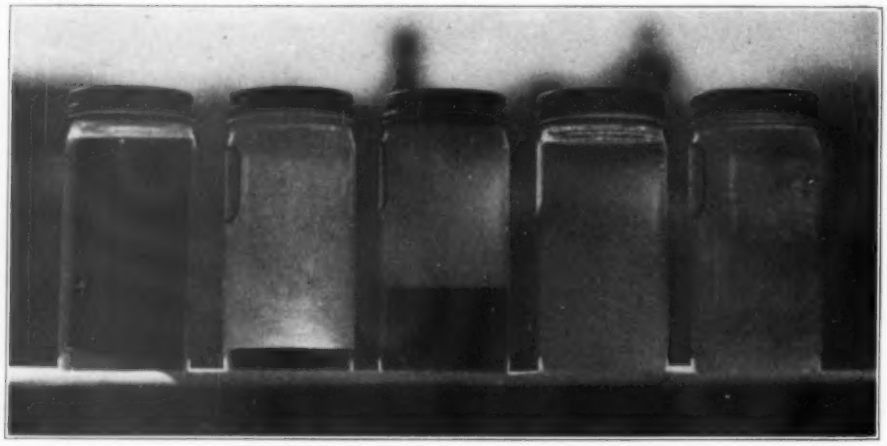
At Richmond, Ind., it is reported that the grit is clean and free of organic matter and that it is stockpiled and used to resurface sludge drying beds. Racine, Wis., uses grit for fill on the lake front adjacent to the public park. Originally the Racine grit channels were so designed that normal flows and velocity were very low and volatile matter in the grit averaged 65.9 per cent with putrescible matter of 8.5 per cent. When the grit chamber was divided into two channels and operated to provide velocities of from ½ to 1 ft. per second, and when the grit removal equipment was operated 30 minutes during each 8 hour period, the condition of the grit improved. If the unwashed grit at Racine contains more than 2 per cent putrescible matter, it is returned to the sewage for a second passage through the grit chamber during periods when velocities are such as to minimize the deposits of putrescibles. With this recirculation and separate washing by forcing clean water through the grit, putrescible matter can be held under 2 per cent and volatile matter between 30 and 40 per cent. Putrescible matter has been reduced 79 per cent by such recirculation alone. In 1944 the cost of operation and maintenance of the grit chambers was 50½ cents per million gallons, of which 38 cents was for labor, 8 cents for supervision and 5 cents for maintenance.

Grease

The effectiveness of grease and oil separation devices has been under research for several years, and while new developments in the equipment field may contribute much to these problems, no startling developments occurred in 1946.

Sedimentation

Riddick & Johnson have presented operating data showing that the percentage of removal of suspended matter appearing on operating records is dependent upon the time of sam-



Wool Scouring Waste as it Progresses from Stage to Stage of Treatment (See Accompanying flow-sheet)

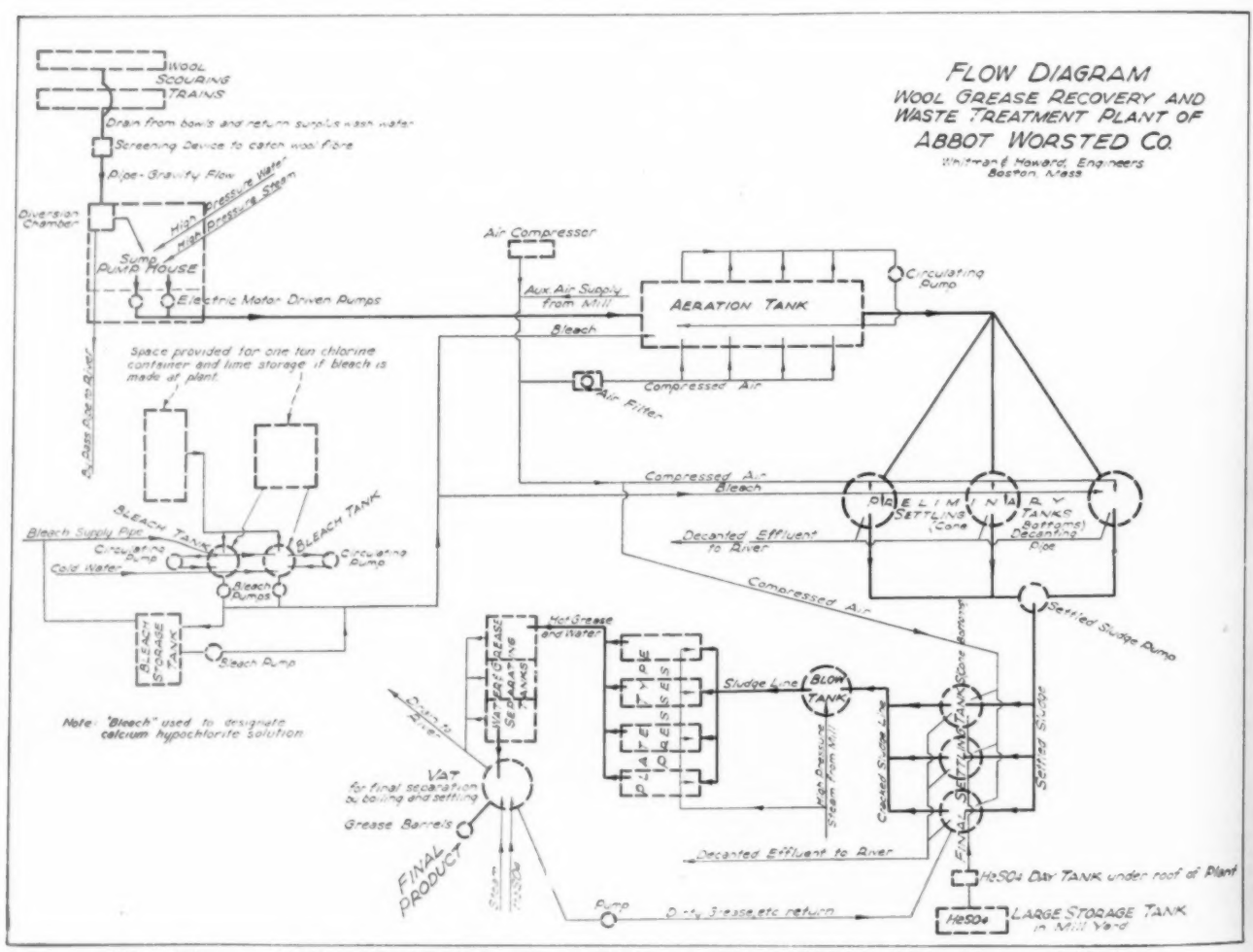
From left: (1) *Raw waste;* (2) *primary oxidation and precipitation with calcium hypochlorite;* (3) *precipitated grease containing sludge after acid treatment;* (4) *effluent from acidification stage;* (5) *final plant effluent, primary plus secondary effluents.*

pling and they have concluded that the indicated percentage of removal is directly proportional to the concentration of sewage. Inasmuch as this concentration is inversely proportional to the flow, the per cent removal is greater where sewer systems have low infiltration. They have further concluded that "per cent removal is more a criterion of infiltration than either treatment efficiency or organic loading of the receiving water," and that an excellent correlation exists between the detention period and the per cent removal of suspended solids.

Oxidation Ponds

D. H. Caldwell, studying Army and Navy oxidation ponds (shallow basins designed for a nominal detention of 3 to 4 weeks and to provide a maximum photosynthetic action) concluded that "sewage oxidation ponds offer a satisfactory solution to the problem of sewage disposal where lands are available, not too costly and which have fair isolation."

On this subject the Committee on Sanitary Engineering of the National Research Council concluded that oxidation ponds to which primary settled sewage was diverted proved to have remarkable ability to remove coliform organisms though the bacterial density was not invariably low, probably because saprophytic organisms were better adapted to survival in the competition for food. Algae activity in daylight hours often was such that bicarbonates were reduced and phenolphthalein alkalinity became as high as 100 ppm., with total alkalinity at 400 ppm., indicating corrosion of one-half of the bicarbonates to carbonates. Average plant D. O. varied from a trace to 15 ppm. and



Flow Diagram of First Wool Scouring Waste Treatment Plant Utilizing Hypochlorite Oxidation: Precipitation Process—a 1946 Development

Plant of the Abbott Worsted Co. of Ford Village, Mass., yields a grease of high quality marketed at a profit.

ammonia nitrogen in the effluent averaged 1 ppm. Increase in nitrate was less than the decrease in ammonia, indicating that the difference had been utilized in the synthesis of algae and other organisms.

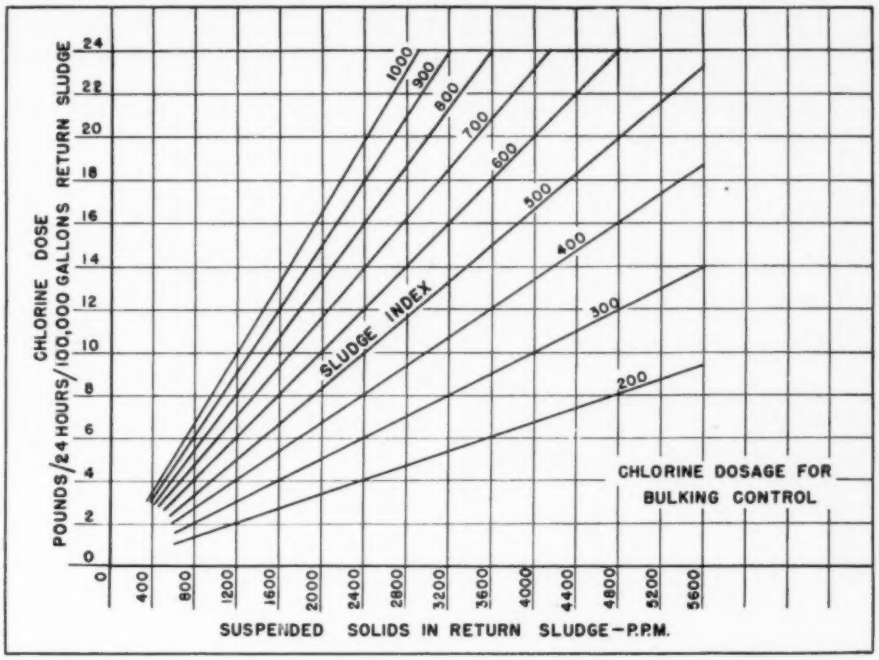
No mosquito nuisance was reported to have developed at the ponds. After two years' operation, without sludge removal, no deposits were visible and the surface of downstream ponds was free from scum or marked plant growths, thus giving a picture of natural self-purification at its best. [This observation brings to mind the strikingly phenomenal lake disposal of the crude sewage of San Antonio, Tex., for many years. Chief weakness was the flourishing algae growth to which riparian owners downstream objected.—Ed.]

Activated Sludge

Trends in the design of activated sludge plants are providing greater flexibility in the control of operations and to facilitate the handling of increased loadings. The Comm. on Sanitary Engineering of the Nat'l. Research Council, after study of four activated sludge plants in military installations, concluded that activated sludge plants as presently designed are not sufficiently flexible to handle the variations in flow and load which occur in military posts. To prevent the loss of sludge over effluent weirs, application of chlorine to the returned sludge and constant vigilance on the part of operating staffs were required.

Prof. Bloodgood points out the value of the B.O.D. test as a useful tool to be used in controlling the biologic loading of a sewage treatment plant, but reminds us of a false security in measuring the efficiency of a treatment plant by utilizing B.O.D. determinations on the plant effluent as the principal criteria.

John W. Hood emphasized the basic role of oxygen in any biological process in creating and maintaining a positive potential favorable to growth of oxidizing organisms, and the need of a downward adjustment of pH values and alkalinity or an adjustment of the oxidation reduction potential. With due attention to these factors, nitrate production in the Ridgewood filter was increased from 4 ppm. to 28 ppm., and maintenance of a minimum D. O. of 2 ppm. inhibited putrefactive types, thus effectively controlling odors throughout the entire plant. Ponding of trickling filters disappeared, although organic loadings were greatly increased



Tapleshay's Chart for Arriving at Effective and Economical Chlorine Dosages for Activated Sludge Density Control and Bulking Prevention
(For full size chart see W.&S.W. for March, 1946)

(Photo by courtesy of POWER)

Paper Mill Waste Treatment Plant of Beach & Arthur Paper Co. at Modena, Pa.

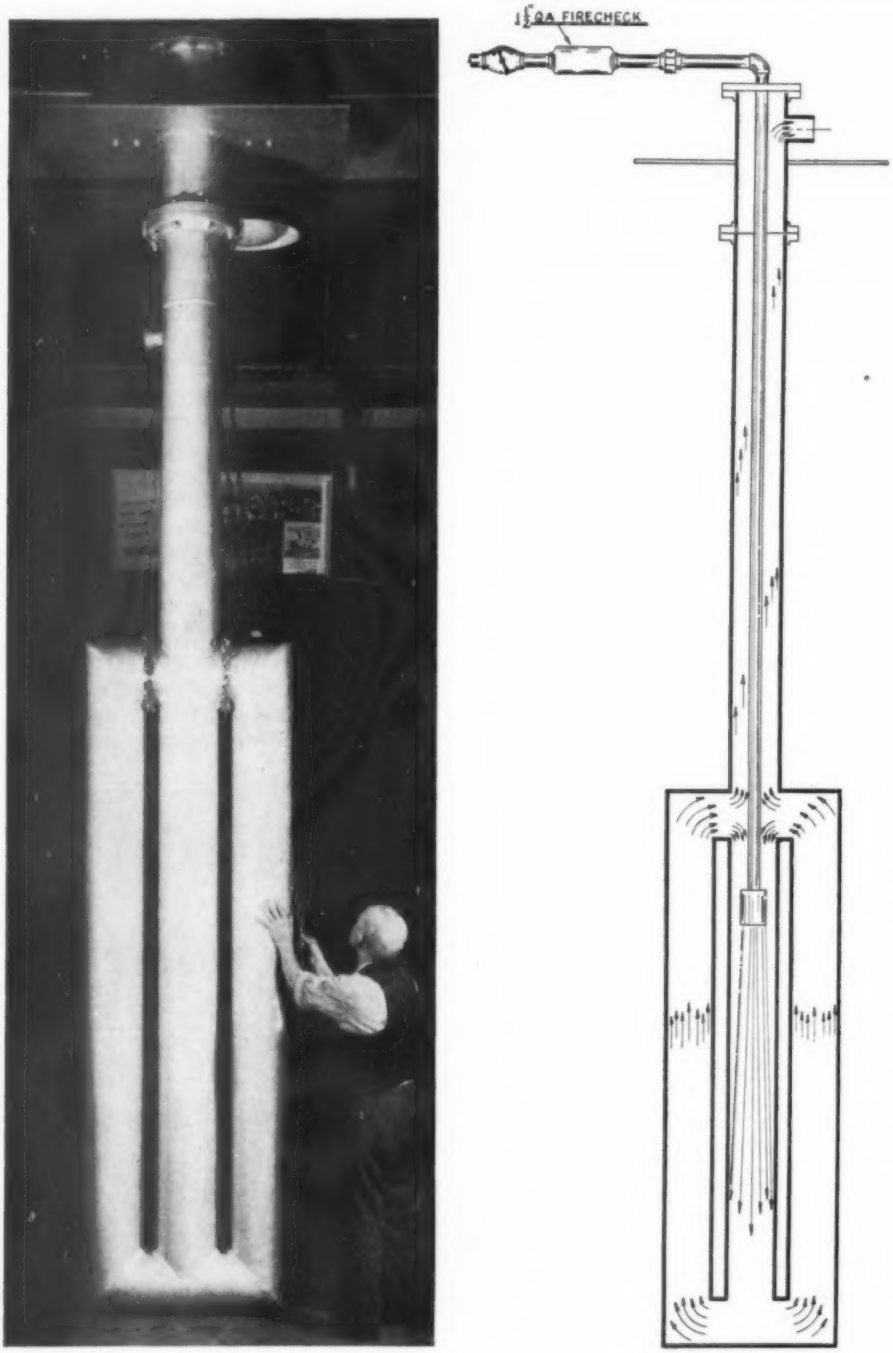
by the omission of intermediate chemical coagulation of the settled sewage ahead of the filters.

Richmond, Ind. utilized 30 feet of head available due to topography, to supplement air application at the activated sludge plant. The aeration tanks are in three sections with a difference of about 15 feet between water surface elevations. "Aero-mix" aerators are utilized in the second and third sections to augment the diffused air supply to the extent of about 700 cu. ft. of air per minute. An unusual feature in this plant is sludge discharged from the sedimentation tanks to the digestors by gravity.

Operating experience at the Camp Shelby, Miss. Activated Sludge Plant has shown that return of even small volumes of supernatant from the digestors to the raw sewage interferes with operation, throws the plant out of balance, causes poor B.O.D. reduction, and results in bulking in the final settling tanks.

At Hackensack, N. J. it has been found that bulking is just as apt to occur when the activated sludge solids and dissolved oxygen in the aerators are high as when they are low. It seems most apt to occur when rain storms flush stale and septic sewage into the plant, and when light oil is consistently present in the sewage.

Elyria, Ohio, experienced major difficulties in clogging of diffuser plates by iron precipitates derived from iron pickling, although those wastes were discharged to an abandoned sandstone quarry. Seeping of the wastes into sewers in wet seasons caused deposits several inches deep to be formed on the plates. Spawling of plate surfaces was of value only for a short period. Holes 7/64-inch in diameter were finally drilled in the diffuser plates. The installation of new plates and the prevention of shock loads which exceeded 100 ppm. "Fe" in the raw sewage solved the problem. The pickling mill officials have agreed to partially treat their liquor wastes before discharge.



Submerged Gas Digester Heating Unit

A 1946 development at Baltimore, Md., the gas-air mixture from an automatic carburetor burns in the center leg, the hot gases traveling to the surface exhaust through the two flanking legs and riser tube. The safety of this device was confirmed by actually burning the gas in an open flame under-water gas burner submerged within the digester sealed against air entry.

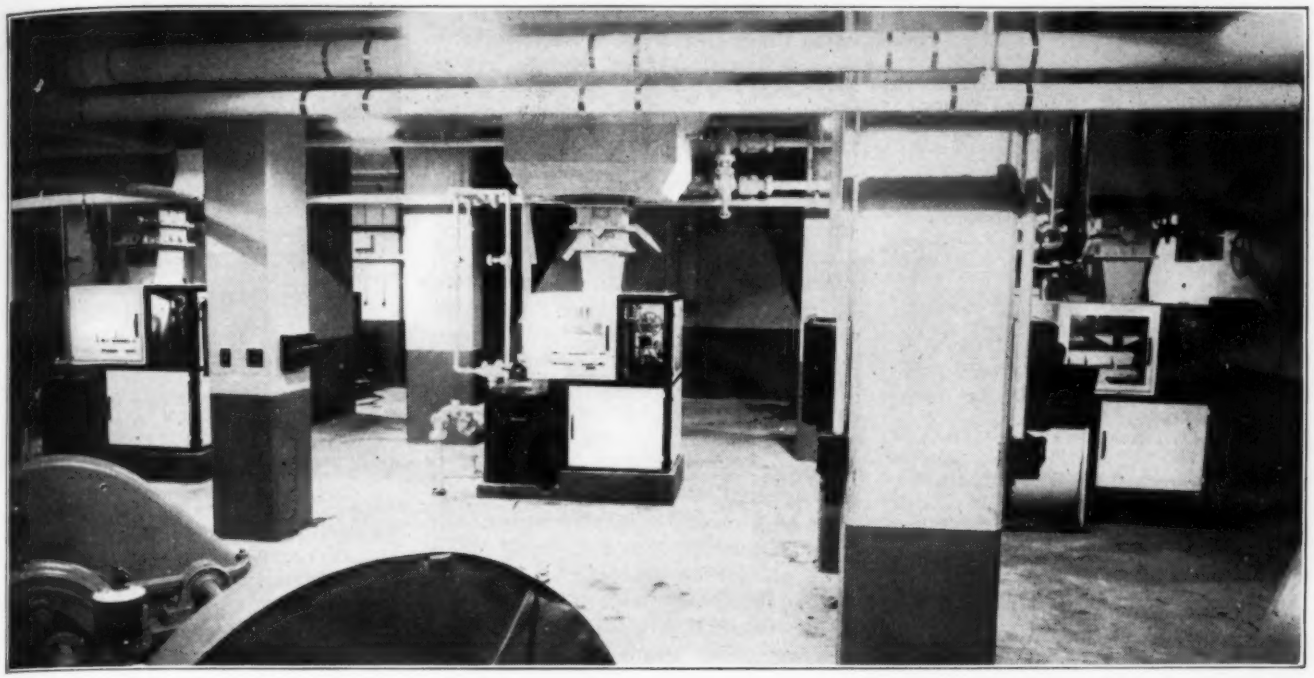
Aeration

Plain sewage aeration was practiced in 1946 at Syracuse, as was done many years ago at Decatur, Ill., and Indianapolis, and at the Wards Island Plants of N. Y. City; and modified sewage aeration has been used at New York's, Bowery Bay, Jamaica and Wards Island Experimental Plants.

At Jamaica, sludge can be readily thickened to an average of 5.9 per cent solids containing 70 per cent volatile matter or a volume of 500 or less cu. ft. of sludge per million gallons of sewage. This relatively low volume, coupled with performance at other plants on short aeration periods, leads to the conclusion that modified sewage aeration may be preferred to plain sewage aeration.

Mann at Syracuse found that plain aeration of sewage required the same volume of air per pound of B.O.D. removal as conventional activated sludge; that aerobic conditions could be maintained throughout the final settling tanks, but he found that the effluent was very turbid generally until the aeration period was extended to 20 or more hours, and even then he found that "the effluent did not approach the sparkling appearance that is typical of the effluent from the activated sludge process." A 30 per cent reduction in sludge volume was noted with plain aeration compared to the previous year when step aeration was employed. This resulted from increased concentration.

It was suggested by Mann that plain aeration might be worthy of



Chemical Feed Room of the Industrial Water Supply Plant of Bethlehem Steel Co.
The plant converting 30 mgd. of Baltimore's sewage treatment plant into a satisfactory industrial water. See front cover picture of the plant proper which is to be doubled in size shortly.

consideration as a temporary emergency procedure in activated sludge plants; as a cold weather operation method where drying beds are not usable in winter months; for pretreatment where secondary units are seriously overloaded; or in plants subject to abrupt shocks caused by strong industrial wastes.

Trickling Filter Loadings

Experience in several trickling filter plants has shown that reasonably good results can be obtained at average loadings in excess of commonly accepted design standards; and that loadings of 500 to 800 pounds B.O.D. per acre-foot do not appear unreasonably high, provided a *fresh* sewage is applied to the filters. Filter media have been generally satisfactory, although some disintegration has been reported at Decatur, Elgin, and Fort Dodge. Ponding has been reported to be caused by poor hydraulics, overloading, industrial wastes, algae growths and excessive film development. Moderate dosages of chlorine or chlorine compounds have been found of value in reducing clogging in a great many plants.

The value of recirculation has been striking at Plainfield, N. J., where Downes has reported 92 per cent B. O. D. reduction by the filters and 97.8 per cent overall reduction in the plant. In discussing this subject, Downes has stated: "While the exact value of either alternating double filtration or recirculation for treating any particular sewage has yet to be determined, the success of these methods in reducing B. O. D. has been proved, and there is little question that they will be used considerably in future in those circumstances where B. O. D. reduction is of most importance. It therefore follows that, in the design of sewage treatment works, the advisability, or at least the possibility, of using one or the other of these methods will in the future have to be considered, and even if new works are not initially designed to function according to either one or the other of these innovations, they should be so constructed that conversion is facilitated."

E. V. Mills, writing of experiments on recirculation for the Institute of Sewage Purification (Eng.), indicates that excellent results were obtained at rates per cu. yd. of filter medium up to four times those with single filtration.

At Fort Sill, Okla., trickling filters operating at constant rate, produced by varying the recirculation pumpage rate to normal flow, produced relative stability of 90 per cent or more with B.O.D. loadings of 750 lbs. or less per acre-foot of filter stone. On the other hand, higher loadings resulted in rapidly decreasing stability.

Psychoda Flies

Still the most common effective method of filter fly control is flooding of the filters every 7 to 14 days for a period of 24 to 36 hours, thus drowning the larvae and flushing out some of the eggs, but chlorination has also been used effectively, as has treatment with DDT.

Chemical Precipitation

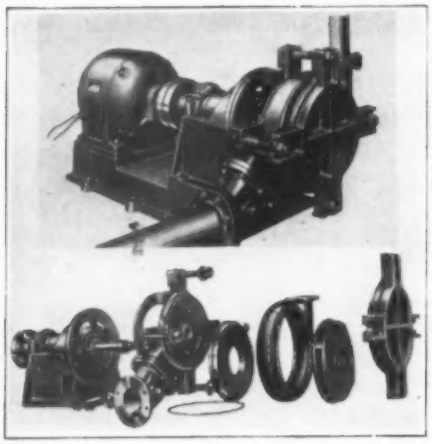
Chemical treatment of sewage has not offered anything new to the design and operation of sewage treatment works during the past year. The volume of sludge resulting from chemical precipitation processes continues to present a difficult disposal problem notwithstanding high treatment costs and failure to provide a degree of treatment required in complete processes.

Considerable activity has taken place during the year by certain groups attempting to promote the use of chemical precipitation for complete treatment. No new basis has been presented justifying the use of such processes.

Moore at Albemarle, N. C., uses chemical precipitation of filter effluent to reduce suspended solids and B.O.D. so that the effluent can be discharged into a small creek which dries up in summer months.

Chlorination

The necessity for more effective disinfection of sewage plant effluents and its control is becoming increasingly more important. The development of differential residual chlorine tests may well contribute to a more effective control of chlorination for disinfection. Specifically these differentiation tests determine "Combined Residual Chlorine" and "Free



The Morris 1946 Slurry Pump
A new sludge and slurry pump of centrifugal design was a Morris Machine Works development.

Residual Chlorine," and now serve as the basis of definition of the two types of chlorination processes practiced in water treatment. The effectiveness of chlorination of sewage works effluents as determined by bacteriological tests affords a more definite approach to the satisfactory solution of sewage disinfection problems.

Chlorine application to sewage for the control of odor and septicity has been demonstrated to be very effective in a wide variety of sewage plant practices. Research on sulfide control by Pomeroy and Bowlus indicates that chlorine is efficient for the destruction of sulfides. Significant in this research are the data describing the mechanics of such chemical action.

Return sludge chlorination has been developed further and its application in the control of activated sludge plants has contributed to more effective control. This practice is receiving recognition as a new tool for operators of activated sludge plants. Tapleshay has described a procedure and experiences for controlling the dosages of chlorine to return sludge for density control. This procedure affords a scientific approach to return sludge chlorination as a means of sludge index control. Tapleshay suggests that chlorine should be introduced into the return sludge at a point which will allow two minutes' contact before mixing with the primary treated sewage. Herda at the Willow Run Sewage Treatment Works reports successful applications of chlorination to return sludge using a dosage of 2 to 8 ppm. of chlorine based on return sludge volumes. Adams at Tenafly, N. J., reports experiences applying scientific control as described by Tapleshay, using an average dosage of 5 ppm. of chlorine, and he states that the effects of chlorination continue after the discontinuance of chlorination.

Improved Sludge and Sewage Sampler
The Pango Depth Sampler for sewage, sludge, or even water, is a product of Drake Mfg. Co. of Philadelphia.

Dreier, in his summary of the operation of standard trickling filters, states, "Chlorination has proved very effective at several Illinois plants where filters were badly ponded due to heavy overload from milk wastes."

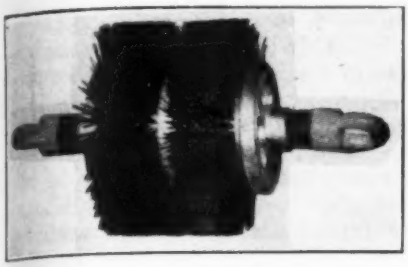
The application of chlorine to the treatment of industrial wastes affords several new uses and has contributed to the satisfactory solution of industrial waste problems in varied procedures.

The Hypochlorite Process for the treatment of wool scouring wastes and for the recovery of wool grease offers a solution for treatment and utilization. Faber described this process and its development in a paper presented at the 19th Annual Meeting of the Fed. Sew. Wks. Assns. in Toronto, which described research and successful operating results by the application of chlorine as calcium hypochlorite solution in a continuous flow and aerating unit. A more recent report is that of Faber and Howard in *Water & Sewage Works* for December, 1946.

Another development is the chlorination of metal treating wastes for the destruction and removal of cyanides. During 1946 there have been several industrial waste plants designed for the utilization of this chlorination procedure. Chlorine as an adjunct to the corrective treatment of industrial wastes existing in public waters continues to be used successfully.

In considering the progress made in the use of chlorine as applied to the solution of sewage and industrial waste problems, the research and technical contributions of Enslow and Faber of the Chlorine Institute must be recognized.

Sewer Construction Involving Long Length Transite Pipe with Root and Infiltration Proof Jointing Promises Low Maintenance Costs and Pumping Economy



New Duplex Pipe Brushes

Were offered in 1946 *by W. H. Stewart of Syracuse as not only a sewer cleansing unit but also for water, oil and slurry lines, of* 6, 8, 10 *or* 12 *inch size.*

Digestion

Research relating to sludge digestion has slowly developed its practical application to the design of heated separate sludge digestion tanks. Practical experiences have pointed to the need of providing for maximum flexibility of operation and better control of all factors affecting the sludge digestion process. The trend to interpret research and operating experiences to sludge digestion design has been slow. Some of the principles which have been recognized by engineers and operators in the maintenance of proper digestion balance are sludge withdrawal, sludge transfer, temperature, and reactions.

One of the manufacturers of sludge digestion tank equipment is stressing the importance of suitable environment in connection with their so-called "Controlled Digestion System of Piping," developed in 1944 and 1945. This system provides for ready liquid saturation of positive submerged scum accumulations; for recirculation of digestion tank liquor; for control of temperature in the scum zone, and for the general flexibility of operation of one or more tanks. Other manufacturers likewise have developed methods, including mechanical equipment, for controlling scum.

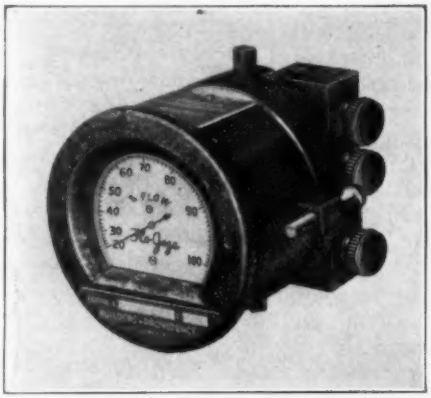
A new method of heating sludge digestion tanks using direct heating with submerged gas burning has been described by C. E. Keefer, Baltimore, Md., in an article on "A New Method of Heating Sludge Digesters."

Sludge Conditioning

Digested sludge at Plainfield, N. J., contains 6 per cent solids; after passing the alum flotation process it contains 15 per cent solids; and after spray drying 85 per cent solids and 15 per cent moisture. Thus, for one ton of solids only 353 pounds of moisture are retained. This dried material contains 4,000 Btu. per pound. Alum flotation and drying, including labor, cost $12.15 per ton. Confirmatory data from two plants (Winnipeg, Can., and the Richmond-Sunset Plant of San Francisco) has been published, indicating a practical agreement between the actual use of ferric chloride in plant scale sludge conditioning for vacuum filtration and the calculated requirements of coagulant by the formula suggested by Genter.

Vacuum Filtration of Sludge

A Wright Cord Filter at Perth Amboy, N. J., is operated at double the rate of the cloth filters, and it maintains the rate continuously with a spray of water washing the cord at each drum revolution. On cloth filters, however, the rates drop 50 per cent of the initial rate after six hours. Sludge containing many short fibers clogs a cloth filter in one hour but not the cord filter.

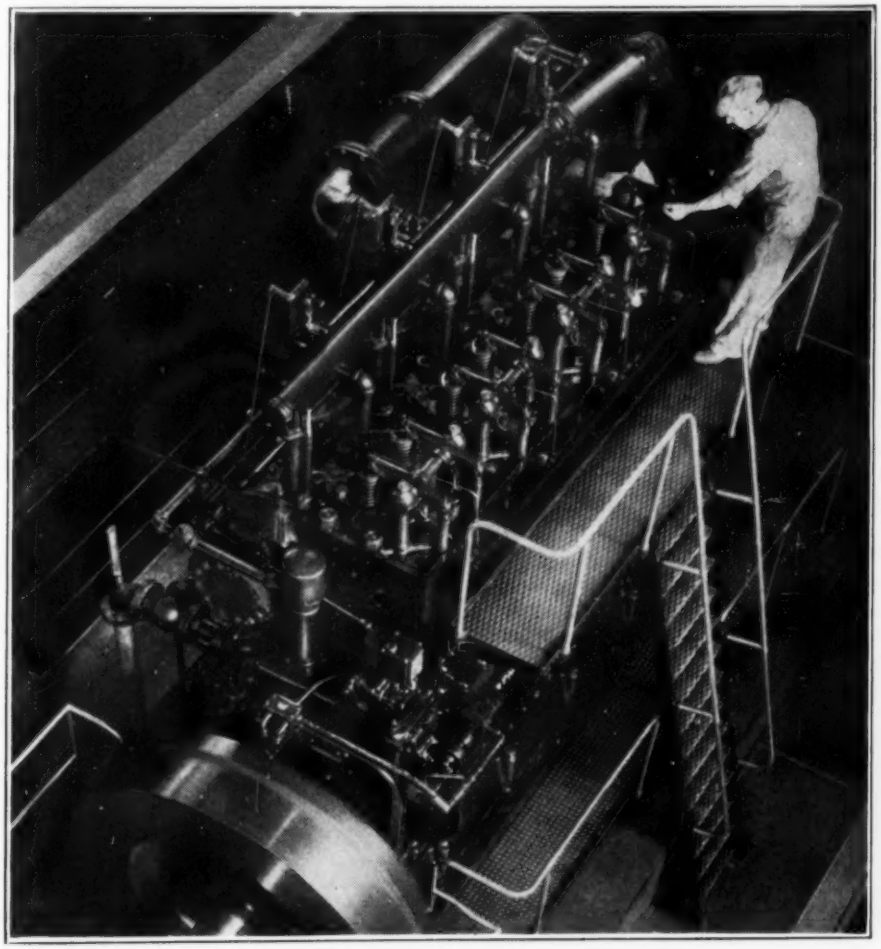


A Midget Differential Meter

During 1946 *Builders-Providence Co. offered the inexpensive midget "Flo-Gage" for use in connection with any differential type of flow indicating unit.*

Disposal and Utilization of Sludge

At Dewsbury, England, lagooning has now been substituted for the older method of burying wet sludge



Another Success Story of 1946

The first dual-fuel gas engine operating in a sewage plant has proved a success at New York's Tallman's Island Activated Sludge Plant. Exact 1946 *records indicate that the complete power requirement for air blower and sewage pumping has been provided by a supplementary fuel oil ration of* 10% *added to the* 90% *power obtained from the available digester gas. While this ratio represents the average for the year, the gas-oil combinations to meet changing seasonal requirements has varied over a range of* 70% *gas* + 30% *oil and* 92% *gas* + 8% *oil. Thus is revealed the great flexibility, dependability and overall economy of the dual-fuel engine as the power source in sewage works operation, and the decision of New York City to standardize on dual-fuel engines for its future sewage works installations.*

(Indianapolis has lagooned sludge for years). The cost was reported as only 8 cents per ton, but labor shortages caused the change from the practice which formerly required 90,000 ft. of trenches 3 ft. wide by 2 ft. deep each year.

In South Africa, generally speaking, there is no discharge of sewage into rivers except in periods of flood. The whole effluent has to be used on the land and no trouble is experienced in disposing of the sludge. According to Hamlin, of Johannesburg, the great difficulty is to stop people from stealing it.

At Hackensack, N. J., the digested sludge goes to a Conkey vacuum filter where it is dewatered and then used as fill material. Chilton, Wis. (population 2,500), makes the sludge from drying beds available to the townspeople. There is not sufficient quantity to supply the demand.

Demands of fertilizer manufacturers for dried sludge for use as fertilizer base have caused the City of Chicago at its Southwest Treatment Works to change the drying methods to produce a granular product for sale. It was originally planned to burn the sludge, but the market has changed so that it is now desirable to sell it. San Francisco uses the sludge cake from the Richmond-Sunset Plant vacuum filters as park fertilizer.

The demand for sludge is so great in some municipalities that it cannot be met as at Milwaukee, Chicago and Houston. Even more widespread use of sludge was recommended by the Fed. of Sew. Wks. Assns. in the Manual of Practice, "The Utilization of Sludge as a Fertilizer." The committee which prepared this Manual found that the fertilizing value of some sludges is about the same as manure and that the value varies with the sludge.

Prof. Bloodgood reported that lagoons of not more than five foot depth may be used very economically and without odor nuisance for digestion of mixtures of primary sludge, activated sludge, plain aeration sludge and garbage.

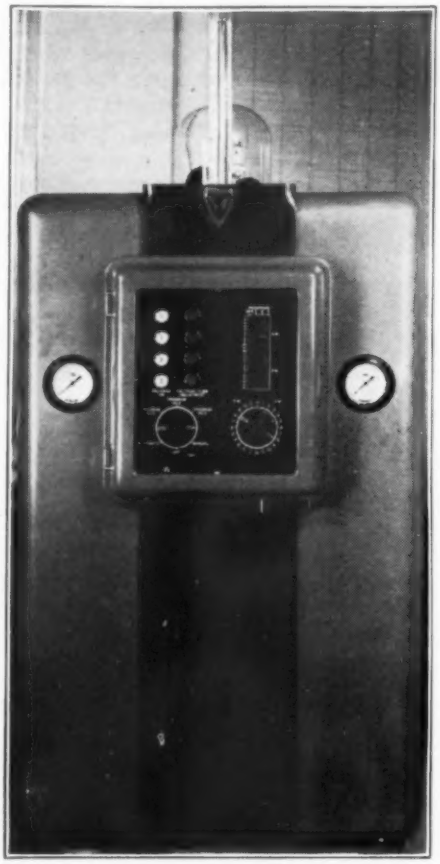
Sludge Incineration

Komline reports a successful application on a full plant scale basis at Plainfield, N. J., of drying wet sludge. Wet sludge, described as the filter cake from a vacuum filter, is converted into powder which is suitable as a soil conditioner, or which may be used as fuel, providing heat for the drying of wet sludge.

At Detroit sludge is incinerated. The dry ash (14 per cent of wet sludge cake) is sluiced into lagoons of sufficient capacity to hold one year's ash production. This is removed to a dump by contract at a cost of $1.51 per dry ton of ash.

Garbage Disposal in Sewers

The gradual spread of the use of home grinders for garbage has been predicted for the future by Cohn, Rudolfs and Babbitt, all of whom feel that the universal practice of this method would still not present insurmountable problems. Rudolfs believes that sludge volumes would



Sewage Chlorinator—1946

This latest W&T "creation" amongst chlorinators provides economical, controlled, programmed chlorination of sewage, trade wastes, etc., to meet variations in flow and chlorine requirements.

be materially increased, requiring double the digestion volume; gas production increased; and probably a 20 to 50 per cent increase in chlorine demand would take place in settled sewage. Garbage grinding at the sewage plant is successful at Marion, Ind., and at Findlay, Ohio, and is being designed for plants for Port Huron, Mich., and Canton, Ohio, where the garbage will be ground and heavy metals, glass, etc., separated in a water tank with diffused air and pumped to the grit chamber. The remainder will be pumped to the sludge digesters which are designed on the basis of 5 cu. ft. per capita.

Effluent Utilization

Probably the most striking utilization of a sewage plant effluent is proposed by Conkling and Goudey in a report to the West Basin Water Association in Los Angeles, Calif. They propose that each year some 30 billion gallons of sewage plant effluent be forced underground through recharging wells to replenish the aquifers from which approximately 25 billion gallons are now drawn annually for water supplies.

At West Haven, Conn., the effluent from a sewage plant is pumped to an air pressure control tank and is used in two chlorinators serving the plant, except for the maintenance of the tray seal. It is also used for the daily wash-down of settling tanks and to break up sludge and scum. Yearly savings are reported equivalent to one-third the pump installation cost. Public water is also conserved.

Uses which have been reported for sewage plant effluents include washing filters and grit; pump seals at Columbus; lawn sprinkling at Richmond; cooling water in a refinery at Corpus Christi; for chlorinators and for sludge elutriation at Stamford; for dilution in digesters at Gary; and for irrigation at San Bernardino, Whittier, Barttesville and Redlands. At Baltimore, Md., where use of sewage effluent by a steel mill was pioneered, plans are now under way to double the amount of water so used and eventually the entire volume of treated sewage effluent from Baltimore will be used by the Sparrow's Point Steel Mill.

Sewage Treatment in Sewers

Confronted with court orders requiring that beach pollution be reduced before June 1, 1946, Los Angeles experimented with "Chloroben," a chlorinated hydrocarbon. It has been reported that in combination with chlorine the total chemical cost is about one-third the cost for the same results with chlorine alone.

When introduced in the lower reaches of sewers where sewage was septic, it has been reported that results were not encouraging, but where sewage was comparatively fresh, results were reported satisfactory. One to two ppm. well distributed throughout fresh sewage reduced bacteria by 50 per cent. Prior to treatment the sewers carried 5 to 25 ppm. of hydrogen sulphide, attacking structures and necessitating forced draft to reduce structural damage. Since the treatment, it has been reported that heavy sewer gas has practically disappeared and all forced ventilation has been discontinued. Continuous line tests have

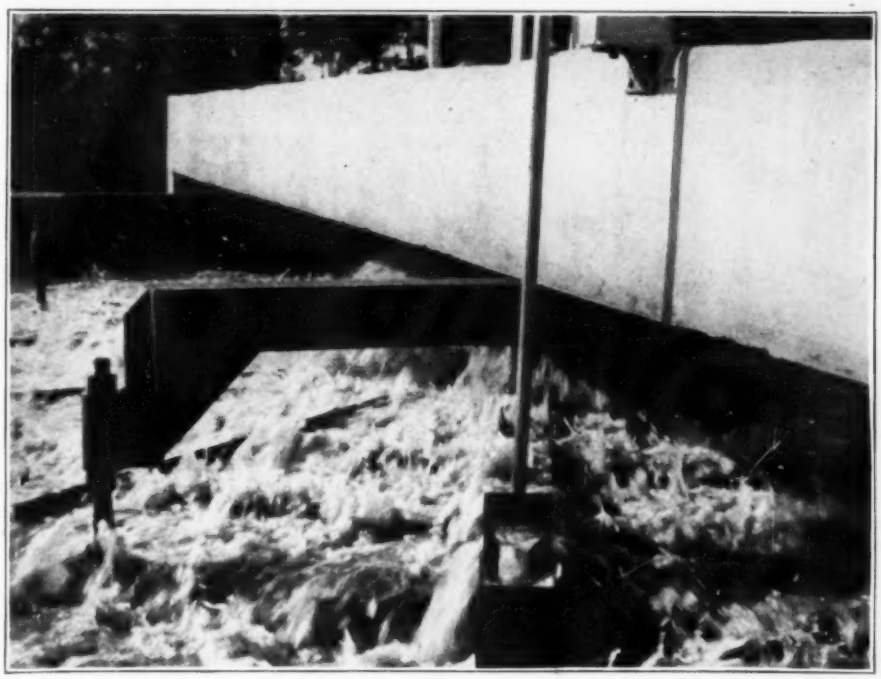
shown a trace to 0.8 ppm. of hydrogen sulphide.

Greases, slimes and bacterial growths previously adhering to side walls have been removed by this treatment, thereby reducing the cost of new construction which would otherwise be necessary and the treatment has also eliminated the need for installing equipment for forced draft ventilation. Treatment is applied from barrels or tanks in about 100 manholes in the upper reaches of the sewer system.

Industrial Wastes

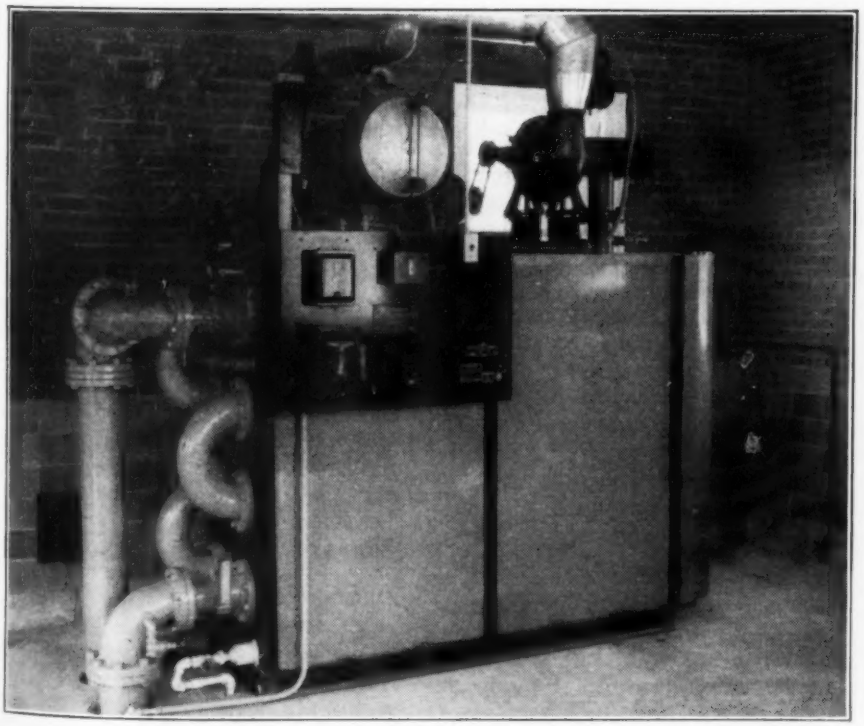
Industrial waste treatment problems have increased with the growth of industry. Activity in the treatment of industrial wastes has been brought about by pressure from various anti-pollution groups and more recently by legislation. Today industry is adopting a clean-up program. Waste disposal is being considered now as an integral part of industrial planning and this should go farther. Waste treatment must be recognized as a necessary plant process and must be given study and research similar to that which has been given to actual production methods. The fact that industry is becoming increasingly aware of its responsibilities is evidenced by the establishment of several industry wide groups for carrying out programs of research and development on wastes utilization and pollution abatement.

The second industrial wastes conference held at Purdue University in 1946 is a continued effort by a progressive group to solve industrial wastes treatment problems. This conference may become important in the solution of industrial wastes problems. The need for the consideration of these problems has been recognized by and integrated into the programs of the meetings of the Fed. of Sew. Wks. Assns. and its member associations.



The Chicago Aerator

Mainspring unit of the popular "Package Plant" of Chicago Pump Co. providing activated sludge treatment for small populations. This 1946 model is serving a real estate development at Pensacola, Fla.



The New P.F.T. Heat Exchanger

Installed in the Champaign-Urbana, Ill., Sewage Treatment Plant for Digester Heating by the Pacific Flush Tank Co.

The hypochlorite process for the treatment of wool scouring wastes, described by Faber and mentioned above, affords a solution to a very difficult industrial wastes problem which has engaged the efforts of engineers, chemists and the industry for many years, dating to experimental studies started in England in 1870. This process was studied on a pilot scale basis and later in a full scale treatment plant.

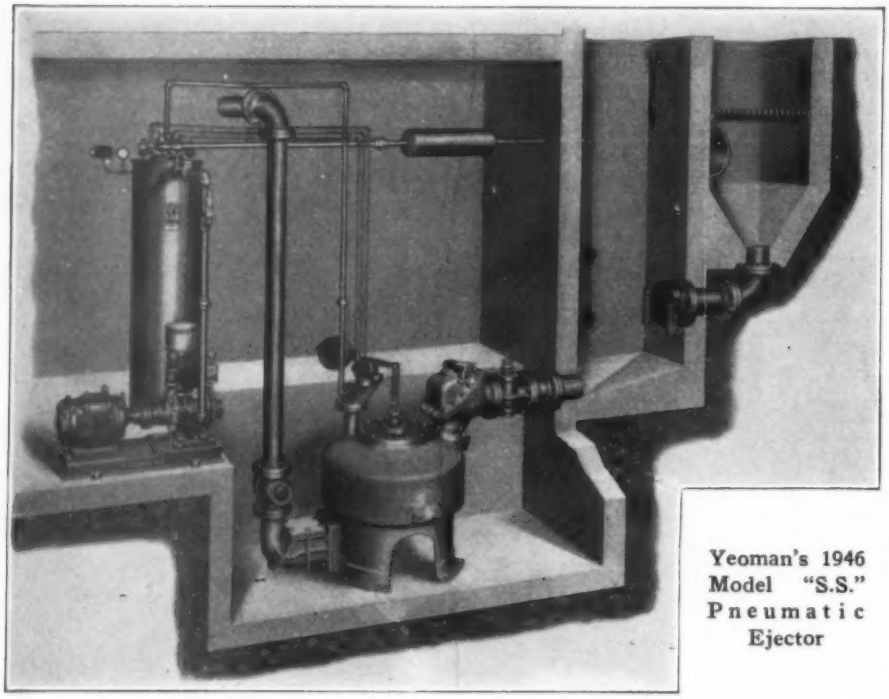
The dosage of chlorine is approximately 50 per cent of the amount of alkali used in the scouring operation. Operation of this process produces an effluent meeting sanitary requirements for wastes discharged to streams or to municipal sewers.

The full scale treatment plant has demonstrated that a large proportion of the installation and operation costs can be met by the sale of wool grease recovered. Several industrial wastes plants have been designed in 1946 for the treatment of metal plating waste for the destruction and removal of cyanide by chlorination, as described by the writer and Wiest.

The effect of industrial waste on sewage treatment works remains a highly individualized problem. The application of empirical formulae to the solution of this problem remains very doubtful.

Laboratory

Trends in laboratory practice are toward physical methods of analyses.



Yeoman's 1946 Model "S.S." Pneumatic Ejector

Operates automatically to transfer sludge, screenings, scum, grease, etc., as a self-contained unit with No. 25 compressor.

Electrometric pH meters and attending electrometric titration apparatus, photo-electric photometer, spectrophotometric apparatus, and conductivity equipment of various types are all being used in laboratory investigations of sewage and industrial waste problems.

Merz points out that practically the only acceptable test for ascertaining the nuisance value of grit is the Dazey Churn test which is, in itself, a very inconclusive determination since it only measures the quantity of free organic material, while large organic solids can be present in the grit and not be correctly reflected in the test results.

Determination of suspended solids in sewage by some means other than asbestos filters has been suggested. Young and Liebowitz suggest the use of paper pulp as a medium. Simpson and Alexander suggest using sintered porous glass discs. In each case it is claimed that results equal to those with asbestos have been obtained, and other advantages are cited, although there are disadvantages. It is typical with development in the science of sewage and industrial waste treatment that laboratory procedures would parallel.

Sampling

In regard to sampling procedures, Riddick and Johnson state: "Before any true comparison of plant efficiencies can be made, a uniform system of sampling is absolutely mandatory as operating data show that almost any removal might be indicated, depending upon the time of sampling. To eliminate existing variations or to handle them uniformly, a standard sampling procedure should be established by a national committee."

The writer makes this tentative suggestion: Influent samples should be composited at 30-minute intervals from 9 to 11 A. M., inclusive. Five corresponding effluent samples should be taken, and the time for each collection determined by the rate of flow to allow for the settling period. Both influent and effluent samples should be proportioned to the rate of flow.

Patents

The tying together of new processes and old equipment or new equipment and old processes, in attempts to reduce competition by patents, has been much discussed, and the report of the A. S. C. E. Committee on Professional Objectives has been applauded for its excellent outline of the problems involved and recommended procedure for the engineer in solving the difficulties encountered by patents.

Equipment

Many new developments have taken place in the sewage equipment field. The Ralph B. Carter Co. has announced items of interest consisting of the cross-head on its plunger sludge pumps and improvements to its rotary distributor featuring a leveling flange and a rim-drive clarifier. The Link Belt Co. has developed a new design for fixed cover sludge digestion tanks with mechanical scum breakers. The Pacific Flush Tank Co. has developed an external sludge digestion tank heater, a supernatant selector, and vertical plate holders for aeration tanks. The Chain Belt Co. has announced several new items relating to the separation of solids from liquids such as the "Verti Flo-Thickener" and the "Stratified Flo-Thickener."

Wallace & Tiernan, Inc., reports the development of a program controlled sewage chlorinator which may be automatically adjusted to the varying chlorine requirements. It takes into consideration the variation in chlorine demand and sewage flow. The Wailes Dove-Hermiston Corp. describe a new bituminous protective coating which will bond satisfactorily to damp surfaces, particularly to concrete and other porous materials. The Omega Machine Co. has announced several new developments in gravimetric chemical feed machines. New equipment and apparatus for use in the sewage field have been placed on the market by Simplex Valve & Meter Co., Chicago Pump Co., Yeomans Bros. Co., Jeffry Manufacturing Co., Infilco, Hardinge Co., The Dorr Co., and Builders Providence, Inc.

Federal or State Aid

Many municipal officials today anticipate State or Federal aid for the construction of sewage facilities. Generally speaking, most municipalities have sufficient borrowing capacity or they can utilize revenue bonds to finance the construction of complete systems or extensions and enlargements to present systems. Sewer rentals can be used as a means to support the revenue bonds. With a Federal debt reaching such high proportions, it appears doubtful if governmental aid will be made available, except during times of great unemployment. On the other hand, the state and municipal debts are lower now than before the war.

Some states have made arrangements for grants to aid in financing the preparation of plans for municipal improvements. The Government, through the Federal Works Administration, will also make non-interest bearing loans for plan preparation.

Acknowledgment

Acknowledgment is made to the engineering staff of Albright & Friel, Inc., for the assistance given to the writer in assembling data for the preparation of this paper. Appreciation is expressed particularly to Gordon J. Wiest and Elwood L. Bean.

N.Y.S.S.W.A. 19TH MEETING IN NEW YORK FOLLOWS A.S.C.E. INDUSTRIAL WASTE SYMPOSIUM

THE Nineteenth Annual Meeting of the New York State Sewage Works Association was held in New York on Jan. 17th following by one day the annual meeting of the Sanitary Engineering Division of the Am. Soc. Civ. Engrs. Both meetings were well attended, and both meetings were largely devoted to the discussions of Industrial Waste Problems.

On Jan. 18th, following the meetings, an inspection trip to the Tallman's Island Sewage Treatment Works of New York City was taken by more than fifty persons. Host and guide for the trip, which included a look at the sludge boat, was Henry M. Rath, Superintendent of the plant.

NYSSWA Presidents

Incoming	Outgoing
A. G. Martin	*Uhl T. Mann*
Supt. Pub. Works	*Supt. Sew. Tr.*
Town of	*Ley Creek Plant*
Tonawanda, N. Y.	*Syracuse, N. Y.*

N. Y. S. S. W. A. SESSIONS

Unfortunately the hotel situation in New York City was such that the annual mid-winter luncheon of the New York Sect. of A. W. W. A. was held on the same day as the N. Y. S. S. W. A. meeting. This conflict undoubtedly cut the attendance at both of these meetings.

Business Meeting

At the business session, the results of the annual election were announced. Officers elected for the ensuing year are:

President

Alexander G. Martin, Commissioner, Public Works Department, Town of Tonawanda, N. Y.

Vice President

Edwin C. McKeeman, Superintendent, Sewage Treatment Works, Freeport, L. I., N. Y.

Secretary

Anselmo F. Dappert, Prin. Engr., N. Y. State Dept. of Health Albany, N. Y.

Treasurer and Asst. Secy.

J. C. Brigham, Asst. Engr., N. Y. State Dept. of Health Albany, N. Y.

New members elected to serve a three year term on the Executive Committee were Rolf Eliassen, Prof. of Sanitary Engineering, New York University; Elvey A. Marshall, Supt. of Sewage Treatment, Geneva, N. Y., and Paul E. Bardet, operator, 26th Ward Sewage Treatment Works, New York City.

The annual Spring Meeting will be jointly held with the New England Sew. Wks. Assn. on May 26 and 27 at Albany, N. Y.

Honored

Federation Kenneth Allen Award

Wellington Donaldson
Dept. of Pub. Wks.
New York City

Honors and Awards

The N. Y. State Sewage Works Assn. makes a Kenneth Allen Memorial Award for the most meritorious paper of an engineering research nature published by a member during the year. The Federation of Sew. Wks. Assns. also gives a Kenneth Allen Award every third year to some person belonging to the member association, that person to be chosen by the member association to receive the award for services rendered to the association and to the profession.

The man chosen to receive the Federation's Kenneth Allen Award in 1946 was **Wellington Donaldson,** Chief, Bureau of Sewage Disposal Design, Dept. of Public Works, New York City. The basis of the award was Mr. Donaldson's long service in the profession in the New York City Department of Public Works, his part in the development of the long range sewage treatment program for the City of New York, and his long active participation in the affairs of the N. Y. S. S. W. A., as a member of the committee which developed the rating award, as a long-time member of the program committee, as a long-time member of the arrangements committee for the annual New York meetings, and as a contributor of valuable papers to many meetings.

Luncheon Speakers

F. S. Friel	*Geo. S. Russell*
Cons. Engr.	*Cons. Engr.*
Philadelphia	*St. Louis*

(Pres. and Vice Pres., F.S.W.A.)

The New York Sewage Works Assn. Kenneth Allen Memorial Award for a research paper was presented to **Thos. M. Riddick,** Cons. Engr. of New York, and **H. O. Johnson,** Supt. of the Belgrave Sewer District, Great Neck, L. I., N. Y., for their joint paper entitled "Solids Removal as Influenced by Design."

The N. Y. State Sewage Wks. Assn. also makes an award to the operator who presents a paper indicating unusual effort beyond that necessary for normal operation of a sewage treatment plant. This award, known as the Lewis V. Carpenter Award, was presented to **Uhl T. Mann,** Supt. of the Ley Creek Sewage Treatment Works, Syracuse, N. Y., for his paper titled "Plain Aeration of Sewage."

Tallman's Island Plant

Henry M. Rath, Supt., Tallman's Island Plant, New York City, read a paper about "The Tallman's Island Plant After Seven Years' Operation." This plan, designed and constructed to handle the New York

World's Fair and surrounding area, is one of the show places of the country. The designed capacity was for 300,000 population tributary and 40 mgd. flow. The actual flow at present is 20 mgd. from a population of 130,000 and the sewage is weak. Plans are now under way to extend the system to take in new building in that general area.

Mr. Rath described the plant, its various units from the sub-grade grit chambers to the sludge storage tanks on the banks of the East River. The plant, an activated sludge system, employs sludge digestion in two stages and utilizes the gas produced to produce power. The plant, being over capacity, makes it easy to obtain flexibility to aid operation.

There is some industrial waste but not enough to cause operation difficulties (except as described later). Only one-third of a cu. ft. of air is used per gallon of sewage. Air used is equivalent to 550 cu. ft. per pound of B.O.D. removed. Return sludge is approximately 39 per cent and runs from 4,000 to 10,000 ppm. solids. Chlorine is used to hold down bulking in the thickeners from which the sludge, when removed, contains about 3.2 per cent solids.

Two stage digestion is employed, with 2 cu. ft. per cap. of digestion capacity in the first stage. Gas produced was equivalent to 1.2 cu. ft. per cap. and the amount of gas produced was equivalent to 70 per cent of the total power requirements (including heat) or 91 per cent of the mechanical power requirements.

Chromate Wastes

Dr. Gail P. Edwards, Chief of Laboratories, Dept. of Public Works and Frederick E. Nussburger, Plant Chemist, Tallman's Island Sewage Treatment Plant, New York City, gave a vivid account of the "Effect of Chromate Waste on the Activated Sludge Process," as was indicated by an incident at that plant.

On two successive days high concentrations of chromate (430 ppm. of chromium and 1440 ppm. of chromium) suddenly appeared in the sewage at the plant. A check of industrial plants showed that to prevent dumping chromate wastes into the sewers, a company hired a scavenger to dispose of the waste and the scavenger disposed of the waste in the nearest manhole. The two "slugs" of waste contained 7½ tons of sodium chromate.

To offset the effect of the waste, step aeration was employed at the plant for several days. Most noticeable effect of the waste was the high turbidity of the effluent for ten days, a drop in the nitrate and nitrite content, and increase in D.O., a jump of the B.O.D. to a value higher than the suspended solids which also went up.

There was no effect on gas production and no reduction of chromate. Inasmuch as this was a one shot instance, there was no cumulative effect, and the results obtained do not necessarily indicate what would happen if there were a constant quantity of chromium discharged into the sewage.

Federation of Sew. Wks. Assns.

Speaking at the luncheon, **F. S. Friel,** Cons. Engr. of Philadelphia, and President of the Federation of Sewage Works Assns., said that the Federation continued to have a very healthy growth, not only in members and finances, but also in service to the industry. Two instances of trends are the recent organization of two associations, which include the words "industrial wastes" in the names of the organizations, thereby indicating the broader scope of service to be rendered.

The Federation is instituting a research program and hopes to obtain a grant-in-aid from the U. S. Pub. Health Service to carry out the program which will first attack the problem of the accuracy of analytical methods for sewage testing.

George S. Russell, Cons. Engr. of St. Louis, and Vice Pres. of the Federation, told about the plans for the meeting in San Francisco next July. That meeting will be held concurrently with the A.W.W.A. conference. Sessions will be separate except for two joint sessions, one sponsored by each of the associations. The A.W.W.A. will act as host at the session, discussing ground water pollution, and the Federation will be host at the session discussing sewage effluent reclamation.

Transportation plans are now complete and one may take either the direct trip out and back or may take a trip with sightseeing trips of two or three days, both ways.

Self-Purification of Streams

In presenting his discussions of "Factors Influencing Self-Purification of Streams and Their Relations to Pollution Abatement," **C. J. Velz,** Head, Civil Engr. Dept., Manhattan College, N. Y., compared a stream to a financial bank, in which oxygen input represented income or deposits in the bank, and B.O.D. represents withdrawals or debt incurred.

The income capacity of the stream goes down as the temperature goes up, and at the same time the rate of amortization (i.e., the rate at which the oxygen demand must be paid off increases). The amortization schedule or rate at which the debt must be paid off is inflexible and varies inversely as the temperature. Furthermore, the debt must be paid at decreasing rates with 50 per cent of the debt to be paid in the first three days.

Factors which affect amortization, besides temperature, are sludge deposits, deviations from normal demand (for example, high immediate demands), and time of passage of pollution through section of stream acting as the bank.

The higher the rate of runoff on a drainage basin, the shorter the time of passage of pollution through the pool. With increased runoff there is shorter passage time, but there is also more income available. It has been noted that the hydraulic crest of any runoff races ahead of the pollution wave. In pools above dams, the rate at which the hydraulic crest precedes the pollution is very rapid compared to the rate of progression in running streams.

If sludge deposits are in pools of large capacity where the detention

N.Y.S.S.W.A. Luncheon—Shots From The Head Table

Left to right: Ed Cleary, an A.S.C.E. programmer, talks with Secy. Dappert and Treas. Brigham; a table of diners; Herb Johnson receives the N.Y.S.S.W.A. Kenneth Allen Award; Sol Pincus, Ed Cleary and ?; another table, John Johnson of Buffalo and "Bill" Foster of American City listen to Friel. (These shots taken by Wellington Donaldson and "Doc" Symons.)

time of the polluted water is long, sludge deposits will have little effect on the payment of the debt to the stream, but in small pools, sludge deposits will have large effects on the dissolved oxygen balance.

In considering the financial balance of any stream acting as a "bank" for oxygen, some thought must be given to income. Income results from increments of run-off, also from reaeration and dissolved oxygen produced by algae. One must also consider stored dissolved oxygen and negative dissolved oxygen.

In the case of run-off, obviously the dissolved oxygen will be proportional to the amount of water entering the stream at the temperature existing. In the case of reaeration, the amount of oxygen income

N.Y.S.S.W.A. Kenneth Allen Award

Thos. M. Riddick
Cons. Engr.
New York City

H. O. Johnson
Supt. Sew. Tr.
Great Neck, L. I.

(Joint Paper on Solids Removal)

is proportional to the oxygen deficit and depends on depth of the stream, agitation, and other factors. Algae, while they produce dissolved oxygen, do so only in daylight and may actually become a liability to the stream, inasmuch as when they die they exert a biochemical oxygen demand on the stream.

Stored D.O. is present in the form of nitrates and to some extent in the form of sulfates. The well operated stream should never draw on the stored D.O., but if this happens, there is then a negative dissolved oxygen and operations are in the "red." Under these conditions hydrogen sulphide is produced and as such may be lost to the air, thereby reducing to some extent the oxygen demand.

With this information one can strike a balance for the stream and determine its general condition. Study should be made in times of drought, and in any study it is imperative that samples are taken at times of constant flow. When the flow is invariable, it is a poor time to take samples. In making any appraisal of the stream's ability to handle the waste load, all that is needed is one good D.O.-B.O.D. profile at one flow level. The conditions for other run-offs can then be readily computed.

Professor Velz believes that one can determine which type of treatment of sewage will give the best river conditions and he warned against designing a treatment plant for 100 year drought conditions, or for that matter, for two year drought conditions. Design should consider normal conditions over a period of several years. Professor Velz also believes that one cannot just arbitrarily change the treatment; one must also consider the stream and its ability to handle an oxygen demand load.

B.O.D. Tests on Industrial Wastes

"Problems in the Application of Biochemical Oxygen Demand Test in Pulp and Paper Wastes" was discussed by **Dr. Harry W. Gehm,** Technical Advisor, National Council for Stream Improvement of the Pulp, Paper and Paper Board Industries, Inc. This same topic as applied more generally to all industrial wastes was also discussed by **Roy F. Weston,** Sanitary Engineer, The Atlantic Refining Co., Philadelphia.

From the result of long study of the problem, Dr. Gehm pointed out that the B.O.D. test must be modified according to the type of waste being studied. Also, the B.O.D. test may not be applicable at all where the oxygen demand is strictly of a chemical nature. It has been found that in pulp wastes the use of a synthetic supplemented dilution water gave a B.O.D. twice as high as that obtained from bicarbonate water.

It has been found that pulp wastes, except for jute, have a similar B.O.D. curve to that for sewage up to five days, but varies thereafter. Fibres, when present, apparently reduce the B.O.D. of the waste and it takes a longer time for the B.O.D. to appear when fibres are present. Furthermore, pulps do not all act alike.

Dr. Gehm is of the opinion that the determination of oxygen demand by chemical means does not give results similar or comparable to the oxygen demand exerted by respiration of biological growths. Gehm therefore expects the B.O.D. test to remain and not to be supplanted by chemical tests.

Mr. Weston, speaking on the same subject, is of the same opinion, that the B.O.D. is not the same as the chemical oxygen demand, and pointed out that some persons believe the B.O.D. test should be discarded. Weston cited several experiments, indicating some of the deficiencies of the B.O.D. test in strong wastes, and noted that 1,000 ppm. of activated carbon present in the sample apparently absorbed some of the material causing B.O.D., thereby lowering the B.O.D. an apparent amount. Weston also notes that the type of seed affects the B.O.D., and that the type of dilution water affects the B.O.D., preferring what he calls a U. S. mean water fortified with various nutrients, etc. This water has an average composition of river waters in the United States.

Foam Phase Biological Oxidation

Something new in the way of oxidation of waste sulfite liquor was

N.Y.S.S.W.A.

Secretary
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Prin. Engr.

Treasurer
J. C. Brigham
Assoc. Engr.

New York State Dept. of Health, Albany, N. Y.

presented by **R. P. Logan,** Assistant, and **Dr. H. Heukelekian,** Associate, Dept. of Sanitation, New Jersey Agricultural Experiment Station, New Brunswick, N. J. Their paper on "Foam Phase and Conventional Biological Oxidation of Waste Sulfite Liquor" was presented by Mr. Logan. In the first experiments on these two methods of direct aeration (liquid phase and foam phase), the experimenters used a soil seed; the air volume was held to below complete foaming conditions and the sulfite liquor contained 49 per cent solids, with 1500 ppm. of SO_2. This waste was used in a dilution of 1 to 5, to which was added nitrogen and phosphorus salts of nutrients. There was no sludge produced under these experiments because the micro-organisms do not floc. After 16 days it was found that the B.O.D. had been reduced only 32 per cent. Heavier seeding did not help. With special yeast the reduction went up to 43 per cent.

The next experiments tried were with aeration to produce complete foam. This system expands the

liquid present in the treating apparatus until it is all in a foam condition, thereby increasing the air-liquid interface. From these experiments it was found that with a waste having a B.O.D. of 19,700 ppm., the B.O.D. was reduced to 12,000 in the first day, to 6,800 in the second day, and to 4,600 in the third day, giving a total reduction of 77 per cent. After two weeks the reduction of B.O.D. was 88 per cent, and there was a growth attached to the sidewalls of the treating apparatus. It was noted that 58 per cent reduction of B.O.D. was obtained in one day without any attached growth. When the growth was present it was found that it was not necessary to re-seed the waste in order to obtain reductions of 80 per cent or more.

New Members N.Y.S.S.W.A. Exec. Comm.

Dr. Rolf Eliassen
Prof. San. Engr.
New York Univ.

E. A. Marshall
Supt. Sew. Treat.
Geneva, N. Y.

(Paul Bardet of New York got away before the shutter clicked)

Obviously there is a high air consumption amounting to 100 cu. ft. per gallon, and it was observed that new growths of biological slime were more effective in the earlier hours. Pure yeast produced a reduction of B.O.D. of approximately 65 per cent. It was also observed that the organic slime recovered 50 per cent of the solids, and that the slime itself consisted of 22 per cent dry solids, of which 73 per cent was volatile matter. This slime growth on the surface of the treating apparatus (a glass tube) was very tough and rubbery. The authors believe that mixed cultures are best and that the best results are produced when the foam volume is kept at a minimum. In other words, so that there is complete foam and no liquids present, an equilibrium is maintained between foam being produced and foam breaking and returning to the liquid state.

The authors are also of the opinion that the sludge or material left can be used for fertilizer and that it could be grown either on a fixed surface or on sawdust distributed through the waste during aeration. In spite of the high air consumption, this method of foam oxidation appears to warrant consideration as a means of treating strong industrial wastes, particularly of the sulfite type.

Inspection Trip

On the Saturday morning following the meeting some 50 or more members of the Association visited the Tallman's Island Sewage Treatment Plant for an inspection trip. This was the plant described on the previous day by H. M. Rath, Plant Superintendent, who with Nathan Kass, Chief, Bureau of Sewage Disposal Operations, Dept. of Public Works, New York City, conducted a tour of the plant, including a tour of one of the sludge boats used to carry the excess sludge out to sea for dumping.

SANITARY ENGINEERING DIVISION, ASCE

One session of the Sanitary Engineering Division of the American Society of Civil Engineers meeting in New York was devoted largely to reports of standing committees. This session was presided over by **George J. Schroepfer,** Chairman of the Executive Committee of the Sanitary Engineering Division, and Professor of Sanitary Engineering of the University of Minnesota.

Water Supply Engineering

A biennial report of the Committee on Water Supply Engineering was presented by Thomas H. Wiggin, Consulting Engineer, New York. By and large there has been little construction in the field for the past two years, and Mr. Wiggin pointed to delays in delivery dates, soaring contract prices, and planning of water works development, mostly on money supplied by federal or state government, as signs of the times following the war.

In the case of cast iron pipe, information appears to indicate a fairly high rate of production as compared with pre-war conditions, but still an inability to apply increased facilities to the large, unsatisfied demand. Lining of large cast iron pipe in place continues to be a trend, there having been some 348,000 ft. of pipe in sizes 30 to 48 in. lined in 1946. Lining of smaller pipe has also continued. Treatment of pipe after cleaning is still in the experimental stage.

The most notable water supply projects of the last two years are the New York City Rondout Creek —Neversink—East Branch of the Delaware project, having 540 mgd. capacity, and the completion and filling of the Quabbin Reservoir for Boston. Detroit, Mich., also has plans for increasing their distribution system, as has the Saginaw-Midland Water Supply project in Michigan. Some 20 other municipalities are listed as either having large scale plans or construction projects under way. Most notable of these are the Oklahoma City Filtration Plant and Pump Station, the Savannah, Ga., plant which plans to use liquid alum, the 25-year expansion program of Atlanta, Ga., and the Metropolitan Water Dist. of Southern California, as well as San Diego and Los Angeles, Calif.

Mr. Wiggin commented on the researches by the Los Angeles Water Department, including those on pipe joints, purification of stored water, the use of the electron microscope in the laboratory, and chemical weed control. San Francisco and the East Bay Municipal Utility District likewise are expanding their water facilities, as are several other California communities.

N.Y.S.S.W.A. Programmers

Dr. G. P. Edwards
Dir. of Labs.
Dept. of Pub. Wks.
New York City

Henry M. Rath
Supt. Tallman's Island Plant
New York City

A considerable section of the report is given over to material on federal river projects and flood control. The committee points out that the protection from sabotage and the matters of mutual aid, cross connections, and interconnections have quickly ceased to be of major importance since the war, but that many interconnections of different systems may still be valuable. The effect of floods, hurricanes, and droughts were discussed; also the construction of dams and spillways.

As to equipment and treatment processes, the Committee reports that in the case of centrifugal pumps, shaft packing has been given much study and it is forecast that a perfected mechanical seal requiring no attention for months and giving low maintenance cost will soon be available. Many other changes have been made, al-

though none of outstanding change in design. Semi-steel is being increasingly used for casings, and investigations have been continued as to causes of noise and cavitation. The Committee also discussed the valuation of public utilities and pointed out that although the NARUC Depreciation Committee reports of 1933 and 1934 have been attacked by special committees of the ASCE and the AWWA, the NARUC Committee had maintained its views. The AWWA Committee on Survival and Retirement has practically completed its formal work, collecting a mass of data covering 13 municipal and 11 private water plants spread over the country.

As to water purification and prevention of corrosion, the Committee report refers to the use of chlorine dioxide, the increasing interest in deaeration for conversion control, plastic lining demineralization of water by ion exchange, proportional chemical feeding, and cathodic protection. The Committee also commented on the new U. S. Public Health Service Standards for Drinking Water, which seemed to have been well received, and noted that the 9th Edition of Standard Method for Water Analysis had recently been announced.

Sanitary Districts

The panel report of the "Committee on Organization, Financing, and Administration of Sanitary Districts" was presented by **George E. Barnes,** Professor of Civil Engineering, Case School of Applied Science, Cleveland. There has been little change in the report since it was first issued two years ago. The Committee has brought up to date certain discussions and comments following the issuance of the preliminary report. The Committee recommends that in the matter of charging for service it should be decided whether water is a service or a commodity, that sanitary engineers should make surveys of the extent of a sanitary district before it is inaugurated, and that a sliding scale should be set up for amounts of money per capita needed before operation of a sanitary district starts.

Not only must some decision be made as to whether water is a service or a commodity in order to establish the basis of charge, but the Committee believes that a combination of water and sewage works emphasizes a need for evaluation of functions of both and a consideration as to whether the individual purchaser of service is a user or a consumer.

In discussing this report, **Mr. John F. Laboon,** Executive Engineer of the Allegheny County Sanitary Authority, pointed out that municipal authorities were a variation of the sanitary districts. In particular, the Allegheny County Authority is the first such unit to be set up wherein all costs will be financed out of revenue bonds. One of the big problems in this Authority is the question of how to allocate charges, inasmuch as water rents and sewer rents in the various municipalities (26) which will take part in the Authority are not uniform. The Authority has therefore decided to make a uniform charge for sewer service and sewage disposal service regardless of the cost of water or other charges within an individual municipality.

Glossary of Water and Sewage Terms

Thorndike Saville, Dean of the College of Engineering, New York University, presented the final report of the Joint Committee on Definitions of Terms Used in Water Works Practice, covering "A Glossary of Terms Used in Water and Sewage Engineering." Dean Saville reviewed the history of the glossary, its growth from a relatively small number of items to an extended book, and the gradual growth of the Joint Committee which has been preparing it. The present Joint Committee includes representatives from the American Society of Civil Engineers, the American Water Works Association, the American Public Health Association, and the Federation of Sewage Works Associations.

In 1944 material was given to Clinton Bogert, Consulting Engineer, for editing and preparation for printing. The material now stands in galley form but has received criticism from reviewers representing the several associations. It was recommended that the Joint Committee select one man from each of the four associations, these to go over the present galley, making such changes as are agreeable to all, before returning the galley to the printer for final correction and printing.

PROGRAMMERS

C. J. Velz
Prof. San. Engr.
Manhattan Coll.
New York

N.Y.S.S.W.A.

Dr. Harry Gehm
Tech. Advisor
Nat. Council for
Stream Improv.

Dr. H. Heukelekian
Associate, N. J.
Agri. Expt. Sta.
N. Brunswick, N. J.

Don E. Bloodgood
Prof. San. Engr.
Purdue Univ.
Lafayette, Ind.

A.S.C.E.

Dr. F. W. Mohlman
Dir. of Labs.
San. District of
Chicago, Ill.

F. De Martini
San. Engr.
U.S.P.H.S.
Cincinnati, O.

Inter-American Sanitary Engineering Association

Edward J. Cleary, Executive Editor of Engineering News-Record, New York, reported on the formation of an Inter-American Sanitary Engineering Association. According to Mr. Cleary, "formation of the Inter-American Association of Sanitary Engineering represents the culmination of discussions among North and South American engineers for at least seven years. Impetus to the formation has resulted from the wartime activities of the Institute of Inter-American Affairs which undertook some sixty million dollars of cooperative work in 18 of the Latin American countries."

The first exploratory conference was held in Rio de Janeiro last June. This meeting was sponsored by the Institute of Inter-American Affairs and the Pan American Sanitary Bureau in collaboration with the Na-

tional Health Department of Brazil. A second meeting held in Caracas, Venezuela, last September, at which some 220 engineers (mostly from Venezuela) attended, there were 14 additional countries that added their approval to the idea of a new organization and steps were taken accordingly.

"Principal object of the Association is to reach by common agreement the solution of problems relating to sanitation and the establishment of standards for the uniform and continuous protection of all the peoples of the hemisphere. This purpose is to be accomplished by:

(1) An interchange of ideas and scientific information concerning developments in sanitary engineering.

(2) Establishment of standards of sanitation for the Americas.

(3) Promotion of good will and better understanding among the persons engaged in sanitation work in the Americas.

Membership is open to engineers and all others engaged in sanitation activities, the annual dues being the nominal sum of $3.00.

The permanent organization will not be completed until the elected delegates convene in a meeting to be held in Santiago, Chile, this fall. In the meantime an interim advisory committee is functioning and the Acting Secretary is Donald L. Snow of the U. S. Public Health Service to the Pan-American Sanitary Bureau. Membership application forms have been prepared and soon will be distributed.

Mr. Cleary states that while the intent of the organization is to divorce itself from any governmental authority, to date all activity depends on the interest of the various governments and particularly of the Pan-American Sanitary Bureau, which is a treaty agency representing the 21 American republics. It is to be hoped that the possibility of eliminating governmental relationship will soon occur, and it is also to be hoped that this organization does not turn out to be a so-called cultural project of the United States.

At the Caracas meeting the papers presented were along the philosophic vein, whereas the engineers of Latin America seemed to be more interested in practical details affecting promotion, financing, and operation of sanitary works. The meeting in Caracas was well attended and had some twelve North American manufacturers' exhibits. Two all-day inspection trips were taken, and the meeting itself was opened by Romulo Betancourt, President of the Revolutionary Board of Venezuela.

New Officers

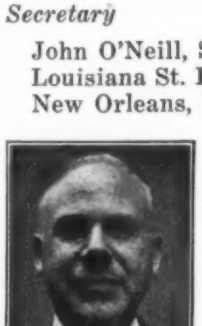
At the beginning of the second session of the Sanitary Engineering Division of A. S. C. E., the officers for the ensuing year were announced, as follows:

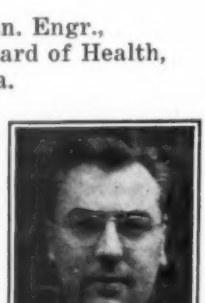
Chairman of Exec. Comm.

Gordon M. Fair, Dean, Graduate School, Harvard University, Cambridge, Mass.

Secretary

John O'Neill, San. Engr., Louisiana St. Board of Health, New Orleans, La.





Chairmen A.S.C.E. San. Engr. Div.

Incoming	Outgoing
Gordon M. Fair	*Geo. J. Schroepfer*
Dean, Grad. School	*Prof. San. Engr.*
Harvard Univ.	*Univ. of Minn.*
Cambridge, Mass.	*Minneapolis, Minn.*

The new member of the Executive Committee is A. H. Wieters, San. Engr., Veterans Hospital Program, Washington, D. C. Other members of the Executive Committee are Ray Goudey of Los Angeles, and Frank Freeburn of Philadelphia. George Schroepfer is the retiring member of the committee.

Housing

The "Sanitary Engineering Aspects of Housing" are frequently misunderstood, if considered at all, according to **M. Allen Pond, Prof.**, Yale University School of Medicine, New Haven, Conn. Delving into the subject in light of his experience during the war as a Sanitary Engineer attached to the housing development programs, Prof. Pond made several generalized observations before going into detail.

At the present time there are approximately four million families who do not have houses and ten million families that have houses that are in a state of disrepair or impossible of repair and modernization. Within the next 25 years, Prof. Pond expects 15 million housing units to be built, and most of this building will be a part of the move to decentralize cities. Suburbs will continue to grow in popularity with city dwellers, and this projects several problems before the sanitary engineer.

Among the specific interests of the sanitary engineer in housing programs and developments are: Selection of site with respect to water supply, sewage disposal, and drainage; the development and installation of the water supply system with due regard to fire protection and per capita demand; the development and construction of sewage disposal systems, which may, in suburban areas, call for septic tanks, package plants or connection with existing systems; mosquito control; and refuse disposal.

Inasmuch as standards and codes for building are now chaotic, and blight areas need study, Prof. Pond believes that there are three approaches at which the sanitary engineer can be of valuable help to the housing program. These three paths are research (on water, sewage, garbage, and plumbing), design and construction, and supervision of construction.

In addition to water, sewage, and garbage in housing problems, the sanitary engineer may also have an interest in and be of help in problems concerned with plumbing, drainage, rodent control, safety, heating, lighting, ventilation, and noise control.

In the discussion which followed the paper, it was brought out that package plants did not work in some instances, but that the cause could not be laid specifically to design, installation, or operation; local conditions often were the important factor. It was also brought out that the type of subsoil was important in the matter of subsurface disposal of septic tank effluent; and that small incinerators were often a nuisance, giving trouble from fly ash, odors, and rats. Prof. Pond believes that it is most important that small incinerators have adequate auxiliary fuel, and he mentioned an installation in Britain which utilizes a separate sewer for garbage. In this case garbage is flushed into its own sewer and delivered to a separate plant, not to the sewage plant.

INDUSTRIAL WASTE SYMPOSIUM

Pollution Legislation

According to **Don E. Bloodgood,** Assoc. Prof., San. Engr., Purdue University, Lafayette, Ind., there

have been a hundred bills introduced into Congress in the last fifty years. None has been passed, and yet a Federal law is urgently needed to coordinate the activities of stream control units.

Prof. Bloodgood decried the failure of conservationists, public health officials and engineers to agree on the type of Federal law that is needed, and he warned that an acceptable law must be passed in the 80th Congress, or industry, which has shown a remarkable cooperation and interest in ridding streams of pollution, will definitely lose interest in the subject.

Reasons for failure of previous bills to pass have largely been because the bills provided for too much Federal control, but Prof. Bloodgood believes that a Federal law could be written to lend support to the states without interfering with State rights.

The Indiana Stream Pollution Control Law has proved effective since its enactment in 1943. It provides for a non-partisan, seven man control board to represent government, public health protection, industry, conservation, labor, agriculture, and the sanitary engineering profession.

In Indiana, stream pollution is about evenly divided as to source between industry and municipalities. The Indiana law makes no specific reference to industrial waste pollution, but considers that removal of any pollution regardless of source is desirable and may be accomplished in general by some means.

Prof. Bloodgood favors a Federal law to coordinate the activities of State Stream Control Units, and further believes that creation of state boards with broad powers to establish regulations (subject to changing times) is necessary. Industry will not object to this type of control if the laws are well written and reasonable.

By-Product Recovery

Some industrial wastes can be recovered at a profit to industry, others may be recovered at no profit or at a slight loss, while still other wastes have no economic basis for recovery as a means of prevention of stream pollution, according to **Dr. F. W. Mohlman,** Director of Laboratories, Sanitary District of Chicago.

As a result of studying all of the industrial waste plants in Chicago, Dr. Mohlman has arrived at some norms for waste volume and load from different types of industrial operations. These values have been applied to the country as a whole to determine the total waste load in the United States.

Among the several recovery plants mentioned was that for recovering grease in slaughter houses where the loss should be less than 0.2 lb. of grease per 1000 lb. of live kill; also mentioned were the grease recovery plants for wool scouring greases, recoveries of oil in refineries, waste from tanning plants, phenol from coke ovens, yeast from breweries, protein in corn products plants, and pulp wastes.

Wastes from packing houses in the United States have an approximate population equivalent of 13,000,000 persons. In breweries, the recovery of grains which contain 7½ per cent oil recovers 37 per cent of the B.O.D. Breweries with a production of 87,000,000 barrels of beer a year have a waste population equivalent of 5,400,000. Recoveries will reduce this value materially.

A.S.C.E. Committee Reports

Water Supply
Thos. H. Wiggin
Cons. Engr.
New York City

San. Dists.
Geo. E. Barnes
Prof. San. Engr.
Case School
Cleveland, O.

In corn products plants the waste loss used to be equivalent to a load of four to five persons per bushel of corn, but now by bottling up wastes and recovery, the loss is but 0.4 to 0.8 persons per bushel of corn ground.

The waste sulfite problem in the pulp and paper industry can be licked by installing a magnesium salt instead of a calcium salt process. This installation is expensive for conversion of old plants but quite feasible in new plants. Alcohol and yeast production from waste sulfite liquors are not too promising as methods of treatment at the present time because of economic reasons. The National Council for Stream Improvement is working on these problems.

Phenol recovery in a by-product coke plant in Chicago has shown a reduction of 97.5 per cent of the phenol with an accompanying B.O.D. reduction of 76.8 per cent.

One of the most unusual wastes is that from laundries which use 16,000 gallons of water per ton of dirty laundry, and produce a waste having a B.O.D. of 100 lb., with 53 lb. of suspended solids, 1.7 lb. of nitrogen, and 34 lb. of grease per ton of laundry.

Dr. Mohlman summarized his basic figures for waste loads as shown below.

Dr. Mohlman closed with the comment that many former losses in industry are now considered as products rather than by-products, but this situation is not to be expected for all industrial wastes, at least at the present time.

Synthetic Rubber Wastes

During the war, synthetic rubber wastes were of considerable interest not only because of the pollution load imposed on receiving waters, but also because of tastes and odors introduced into water supplies. **Frank E. DeMartini,** San. Engr. of the Water and Sanitation Investigations, U. S. P. H. S., Cincinnati, Ohio, read a paper on this subject jointly prepared with O. R. Placak and C. C. Ruchhoft.

Mr. DeMartini suggested that for taste and odor control, it is more effective to treat the wastes than it was to try to remove the taste and odors from the water supply. A method is needed to both remove tastes and odors and reduce the B.O.D. of the wastes. Aeration was tried with indifferent success. Activated sludge treatment with 24 hour aeration produced 90 per cent B.O.D. reduction. Sewage must be added in the proportion of three to one in order to make available phosphates and nitrogen needed for metabolism.

Mr. DeMartini reviewed a number of experiments and said that pilot plant experiments are needed to completely evaluate methods of treatment. (G. E. S.)

Industry	Basis of Unit	Waste Load per Unit Ton	
		Lb. B.O.D.	P. E.
Packing plant	Live weight	28.9	173
Brewery	Beer	23.6	142
Laundry	Dirty clothes	100	600
Corn products	Corn	4.8	29
Coke	Coal	1.9	11

TRANSPORTATION SCHEDULES FOR SAN FRANCISCO CONFERENCES

AWWA-FSWA Transportation Committee Announces Special Train Schedules and Tour Arrangements*

PLANS have been made for three special trains to accommodate those planning to attend the Conferences of the Am. Water Works Assn. and the Sewage Works Federation in San Francisco, July 21st-25th. A choice of fast travel direct routes and alternate routes permitting sightseeing in either or both directions is being provided. In addition, the Transportation Committee is prepared to assist in securing transportation by air. Furthermore, if sufficient requests are received, consideration will be given to chartering special plans for the trip to and from San Francisco.

Since the time of the original announcement by the Transportation Committee, complications have arisen necessitating changes in some of the plans. The schedules given herewith supersede previous announcements.* It is believed that the accompanying schedules will be final, but if there are further changes, those who have requested accommodations on the routings concerned will be notified.

All who desire accommodations for travel to and from San Francisco should fill in the questionnaire which is a part of the announcement being issued by the two associations. The questionnaire should be mailed promptly to the address given in the questionnaire and should not be mailed to the office of either association.

Three Special Trains

For the trip to San Francisco, three special trains have been scheduled, namely, the New York Special, the New York Alternate A and the Dixie Special. Also three special trains have been scheduled for the return trip, namely, the New York Special, the New York Alternate B and the Dixie Special. Schedules of these trains are included herewith showing the important junction points en route. As requests are received the Transportation Committee will attempt to work with other railroads to make up full cars. If such arrangements can be worked out, these full cars will be cut in to the special train at the most convenient junction point and will be occupied by the passengers for the entire trip to San Francisco. Also, where possible, similar arrangements will be made for the return trip.

*Superceding all releases prior to January 15.

Expenses

The New York Special to San Francisco and the New York Special returning and the Alternate B returning are to be worked out on an all-expense basis. Therefore, all en route expense, including meals and regularly scheduled sight-seeing tours, will be included. The special train from New York to San Francisco and the special train returning will cost approximately $350 per person from New York. Going to San Francisco on the special and returning on Alternate B will cost approximately $450 per person from New York. These estimates are based on compartment occupancy by two persons. Rates for other types of accommodations and other points of departure will be in proportion and are obtainable from the Chairman of the Transportation Committee. Costs on the Dixie Special are now being developed also.

In order for the committee to make arrangements for passenger's comforts en route and also to arrange for special tours, it is necessary that the committee know the desires of those wishing to travel by the special trains promptly.

Transportation Tax Exemptions

On all rail and Pullman fares a 15 per cent federal transportation tax will be charged on each individual item unless an exemption certificate is filled out on Form 731, Treasury Dept., Internal Revenue Service, copies of which are obtainable from the various offices of the Internal Revenue Dept. Exemption certificates must be furnished for each item. Any municipal, county, state or federal employee may fill out Form 731 provided that travel is recognized as official business, and also provided that the official nature of the travel is, or will later be, evidenced by reimbursement of the amount paid for transportation.

ROUTE OF THE NEW YORK SPECIAL

The routing of this train has been changed because confirmation of hotel accommodations at Colorado Springs could not be obtained. The train will leave New York, Monday, P.M., July 14, traveling via Philadelphia, Pittsburgh, St. Louis and Kansas City (Southwest Junction) to Denver, Colo., arriving there Wednesday morning, July 16.

At Denver passengers will leave the train for a sight-seeing tour by bus through scenic Rocky Mountain National Park and have luncheon at one of the resorts in the park. Tour by bus will continue in the afternoon, ending at Granby, Colo., where the train will be boarded again to continue the journey to arrive in Salt Lake City Thursday morning, July 17.

Thursday morning and afternoon will be spent on sight-seeing tours in the impressive city of the Mormons and nearby vicinity. Arrangements are to be made to obtain luncheon and dinner in the city. Thursday evening the train will be boarded for Las Vegas, N. M., arriving there Friday morning, July 18.

The highlight at Las Vegas is a trip to Boulder City for a tour of the world famous Boulder Dam. Any additional time can be spent sightseeing and night-clubbing in Las Vegas. That evening passengers will return to the train and go to Los Angeles, arriving there Saturday morning, July 19.

The stop at Los Angeles has been arranged at the specific invitation of members of the California Section, A. W. W. A., and the California Sewage Works Assn. Arrangements are to be made for sight-seeing tours to points of interest to members of the water and sewage associations.

Saturday evening members will entrain for the last leg of the journey to San Francisco, arriving there Sunday morning, July 20. This early arrival will permit time to rest up after the strenuous trip or to see some of the sights in San Francisco, including its famed Chinatown nearby the hotels.

This trip has been arranged on an

all expense basis, which covers all meals en route and all scheduled sightseeing tours.

Departure time from various key points to join with this train are as follows:

Lv. Sun. P.M., July 13—From Charlotte, N. C., Columbia, S. C., Jacksonville, Montreal, New Orleans, Tampa.

Lv. Mon. A. M., July 14—From Albany, N. Y., Atlanta, Boston, Toronto.

Lv. Mon. P. M., July 14—From Birmingham, Buffalo, Chicago, Cleveland, Dallas, Detroit, Memphis and Pittsburgh.

Lv. Tues. A. M., July 15—From Oklahoma City, Minneapolis, St. Louis.

Lv. Tues. P. M., July 15—From Kansas City (Southwest Junction).

ROUTE OF THE N. Y.- SAN FRANCISCO ALTERNATE A TRIP

This schedule and routing is provided for those who wish to take as little time as necessary for the journey to San Francisco. The train will leave New York Thursday P.M., July 17, traveling via Philadelphia, Pittsburgh and Chicago, and arriving in San Francisco either Sunday P.M., July 20, or Monday A.M., July 21. On this schedule no stop-overs are provided.

Although this will likely not be a special train in the true sense, every endeavor will be made to secure accommodations in regular or special through cars, so that members can travel as a group.

Departure time from various key points to join with this direct train are as follows:

Lv. Thurs. A. M., July 17—From Boston.

Lv. Thurs. P. M., July 17—From Albany, N. Y., Memphis, Montreal, Toronto.

Lv. Fri. A. M., July 18—From Buffalo, Cleveland, Detroit, Minneapolis, Pittsburgh.

Lv. Fri. P. M., July 18—From Chicago, Kansas City (Union Station), St. Louis.

DIXIE SPECIAL TO SAN FRANCISCO

(Under supervision of Thomas L. Amiss, Supt., Dept. of Water and Sewerage, Shreveport, La.)

This routing has been planned specially for members from the southern states, although all members are cordially invited to take advantage of the facilities provided. Those from the East and Southeast will converge on New Orleans, where the train is scheduled to leave Wednesday evening, July 16, traveling via El Paso and arriving at the Grand Canyon Saturday morning, July 19, where the entire day can be devoted to viewing this never-to-be-forgotten, awe-inspiring World's Wonder. The train leaves Grand Canyon Saturday evening, July 19, and arrives in San Francisco Monday morning, July 21.

Departure time from various key points to join with this train are as follows:

Lv. Mon. P. M., July 14—From New York.

Lv. Tues. A. M., July 15—From Kansas City, Miami and Tampa.

Lv. Tues. P. M., July 15—From Charlotte, N. C., Chicago, Columbia, S. C., Savannah, Jacksonville, Memphis and St. Louis.

Lv. Wed. A. M., July 16—From Atlanta and Birmingham.

Lv. Wed. P. M., July 16—From Jackson, Miss., Mobile, Montgomery, and Shreveport.

Lv. Thurs. A. M., July 17—From Houston and Little Rock.

Lv. Thurs. P. M., July 17—From Dallas, Oklahoma City and San Antonio.

New York Special Returning

This train leaves San Francisco Friday P. M., July 25, and travels without stopover via Chicago, arriving there Monday A.M., July 28, and in New York Tuesday A.M., July 29.

New York Alternate B Trip Returning

This trip is designed to take in some of the beautiful sights in the far west. It leaves San Francisco Friday P.M., July 25, arriving in Portland, Ore., Saturday, July 26, in time for luncheon. Afternoon sightseeing in Portland; leave for Seattle, arriving there early Sunday. Leaving the train, members board boat for Victoria, B. C., Canada.

Breakfast and lunch on the boat; disembark at Victoria for a sightseeing tour of the city and nearby vicinity. Late afternoon, board boat for return trip to Seattle, dinner on the boat. On arrival at Seattle, board the train for the journey to Glacier National Park, arriving there Monday P.M., July 28.

After a three day tour and three restful nights in this beautiful park, continue by train to Chicago, arriving there Saturday P.M., August 2. Connections permit arrival in New York Sunday A.M., August 3.

Dixie Special Returning

(Under supervision of Thomas L. Amiss, Supt., Dept. of Water and Sewerage, Shreveport, La.)

This train will leave San Francisco Friday P.M., July 25, and arrive in Los Angeles Saturday A.M., July 26, for an inspection trip in Los Angeles and vicinity to points of interest to members of the water and sewage associations. This stop has been arranged following an invitation from members of the California Section of AWWA and the California Sewage Works Assn.

The party will leave Los Angeles Saturday P.M. and arrive in Las Vegas Sunday A.M., July 27. Here the party can ride by bus to Boulder City for an inspection of Boulder Dam, and additional time can be spent sightseeing in Las Vegas.

That evening the train will be boarded for Salt Lake City, arriving there Monday A.M., July 28. After a day of sightseeing, again board the train, arriving in Kansas City 8:10 A.M., Wednesday, July 30. From this point members of the party will go their separate ways homeward.

Persons interested in taking any of these AWWA-FSWA scheduled trips should write directly to

E. A. Sigworth,
(Transportation Chairman),
Suite 1333,
230 Park Avenue,
New York 17, N. Y.

Note—Hotel accommodations at San Francisco are not made by the Transportation Chairman.

J. R. Cook Becomes Resident Manager for Buck, Seifert and Jost in Puerto Rico

James R. Cook, formerly Project Engineer in charge of design of water and sewer systems for the City of Caracas, Venezuela, now is Resident Manager for Buck, Seifert and Jost, New York consulting sanitary engineers, with headquarters at the Medical Arts Building, San Juan, Puerto Rico. In his new association he will be engaged on important water and sewage works improvements for the Insular Government.

Mr. Cook has been associated with work in Latin America for about five years, first with the Caribbean Architect-Engineer on design of water supply and sewage works for Army Bases in Trinidad, Antigua, British Guiana, and St. Lucia; and later with Parsons, Brinckerhoff, Hogan & Macdonald, and Consulting Engineers, C. A., on design of dams, hydroelectric plants, and water and sew'ge improvements in Venezuela.

Prior to his work in South America, Mr. Cook was with the City of Philadelphia on the rehabilitation of the existing water works system and had served with the late Allen Hazen, famed consulting sanitary engineer, and successor organizations for nearly eighteen years.

A WATER SERVICE THAT DELIVERED ROAD TAR*

By FRED J. RENY
General Manager
PORTLAND WATER DISTRICT
PORTLAND, ME.

IN forty-two years of experience in serving water to the public, I think we have experienced the most unusual complaint ever received from a water taker.

The complaint was that tar, the thick, black, oily material used to spray on a road surface and then quickly covered by dry sand, was being delivered into a dwelling through the water pipe.

At first, the usual routine investigation was made. Our chemist called and took a sample of the water and suggested that the system in the immediate vicinity be blown off, which was done.

The water system consisted of a 12 in. main in the avenue 900 ft. away and 500 ft. of 8 in. on the street leading to Kineo St., where the complaint originated, and on the end 400 ft. of 2 in. galvanized steel pipe to Kineo St., where it is deadended. The system is comparatively new, the 8 in. being laid in 1944 and the 2 in. in 1925. The water service pipe was copper throughout and was laid in 1940. No other person on the street made any complaint.

As Kineo St. was built up in 1940, the buildings and water service could be called "new." The character of the soil at this location was a clay base with about one foot of loam near the surface.

When the street was built, it was crowned to the extent that the center of the street would shed all precipitation into the shallow gutters. The street has no curbstone as yet.

Two years ago the Street Dept. gave the street the usual coating of road oil. This was the same variety used on other streets and was immediately covered with sand to form a coating. We have all seen this happen too often to describe, *but* this was not the usual reaction in this particular street because the sand did not absorb the oil or tar and the Street Dept. made several trips later on and spread more and more sand in order to try to prevent the oil from coming to the surface, where it would lay in pools in the gutters. I am informed by the Superintendent of the Street Dept. that several complaints of this nature were received as the oil was tracked into the homes by children.

When we received the second complaint after the blow-off had been made, we began to believe something was occurring differently from the usual, which caused the water taker to register a more emphatic complaint. I accordingly ordered the water meter to be taken out for inspection and connected up with a nipple. Also, the service was thoroughly flushed with a hose, but all to no purpose whatever. The tar was still there.

A short time later two men were sent to dig the stop and waste in order to find out where the tar was coming into the same. When the men had the hole dug, we were on hand to see the results.

It seems that the owner had the water shut off on Nov. 19, 1945, and spent the winter in Florida. The water was let on again on April 22, 1946. During this interval the tar, which is black, oily and viscous, flowed down the curb box and formed a pool around the stop and waste cock. When the water was shut off, the waste outlet in the stop being open allowed the road tar to enter the service pipe and flow towards the cellar. When the water pressure was again restored, the waste outlet being closed, the tar was forced into the house piping. The owner said in a rather humorous way, "The way to learn the Black Bottom is to take a bath in my bath tub."

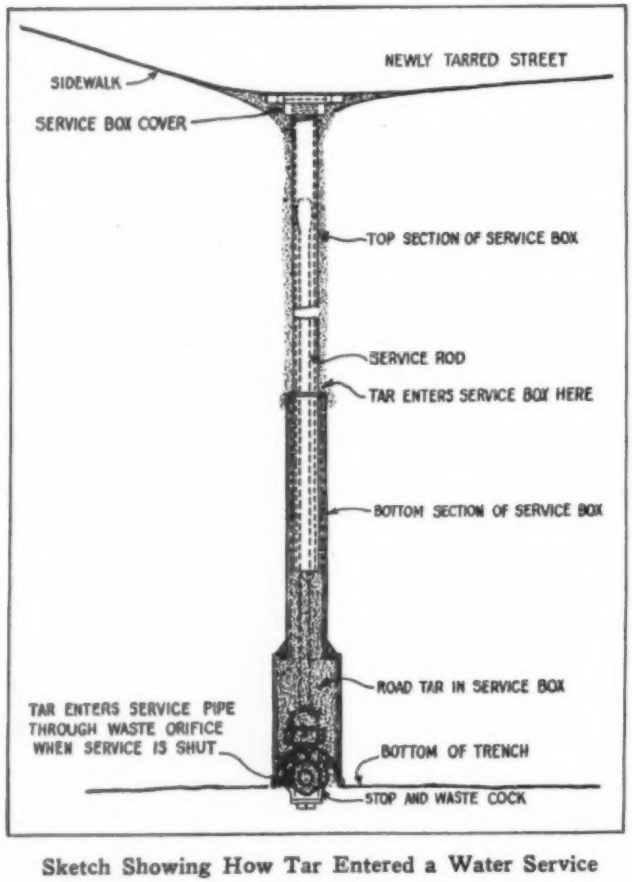
This experience is valuable in more than this special case. If the street had sewage or any other objectionable liquid in the gutter, it might have entered the service in the same way.

As it was, it cost us a lot of investigation, the labor of several men and an official investigation, together with a new copper service from stop to building.

When the renewal was made, however, the stop and curb box was moved four feet nearer the building so that no drainage could enter at this higher elevation.

Ed. Note: We are printing Mr. Reny's report for the lesson that it teaches—namely, the hazard of the stop and waste cock as a shutoff device when located beneath ground surface. The Portland experience calls to mind an earlier experience wherein worms in water drawn through so-called frostproof yard hydrants were traced to their entry into the hydrant barrel through the drain hole located at the bottom of this type of yard hydrant that, like the stop and waste cock, is self draining.

*A paper presented before the Maine Water Utilities Ass'n.


NEWLY TARRED STREET
SIDEWALK
SERVICE BOX COVER
TOP SECTION OF SERVICE BOX
SERVICE ROD
TAR ENTERS SERVICE BOX HERE
BOTTOM SECTION OF SERVICE BOX
ROAD TAR IN SERVICE BOX
TAR ENTERS SERVICE PIPE THROUGH WASTE ORIFICE WHEN SERVICE IS SHUT
BOTTOM OF TRENCH
STOP AND WASTE COCK

Sketch Showing How Tar Entered a Water Service

POWER AND WATER RATES AS AFFECTED BY PUBLIC DEMAND

And A Program of Plant Expansion Which Involved Recreational Development That Is Paying Off

By ROBERT B. SIMMS
Superintendent
PUBLIC WORKS COMMISSION
SPARTANBURG, S. C.

Editor's Note

Perhaps the reader would be interested to learn of one reason behind the request to "Bob" Simms for an account of the Public Relations status of the Water Department and the Spartanburg folks. Amongst other observations the following editorial taken from the Spartanburg Herald-Journal some time back is evidence that "Bob" Simms is as much a part of the Spartanburg water works as the water works is a part of "Bob" Simms.

Farseeing and Practical

"'An institution is the lengthened shadow of one man' is a saying that has peculiar and special significance when it is applied to the Spartanburg water works and R. B. Simms.

"First of all, Mr. Simms, as superintendent of the water works, has had faith in the future of Spartanburg. Twice during the past 24 years he has recommended, and the commissioners of public works have approved, plant expansions considerably beyond the water requirements at the time. Each time his faith has been justified, and water consumption has increased to near capacity. Now for the third time he and the water commissioners have recommended further improvements and developments. Thoughtful citizens will think twice before dismissing the proposals as extravagant and over-optimistic.

"Second, this expansion has been accomplished with efficiency and a minimum of burden to the taxpayers. The fact that water rates have been cut in half and that revenue is sufficient not only to retire the bond issues as they come due but also to finance the proposed improvements is proof enough of the efficient conduct of the water works.

"A third 'specification,' which might be called the 'plant capacity' of the man, is equally important. Unassuming, thoroughly acquainted with his subject, far seeing, yet practical, he has been so completely devoted to his work that people have come naturally to think of him when they think of the water works and of the water works when they think of him."

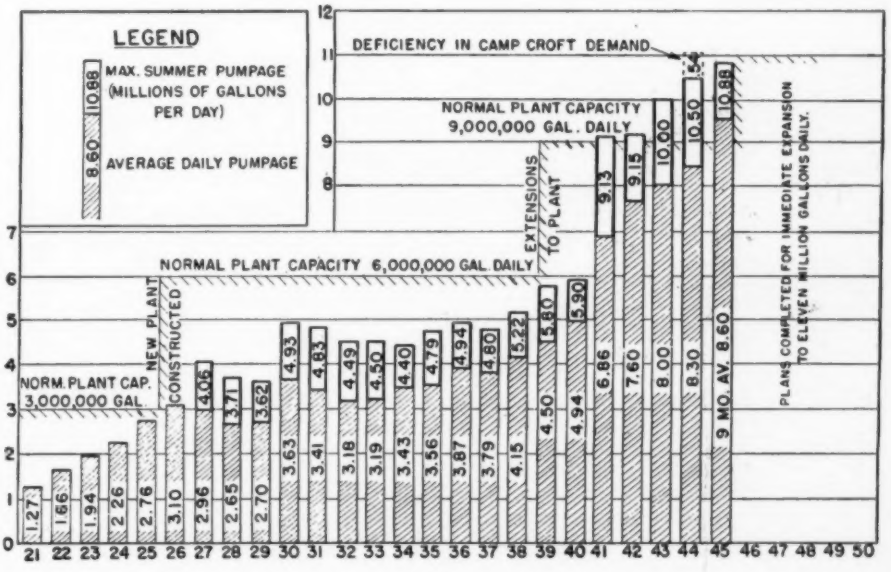
The Author

WHEN Linn H. Enslow, Editor of *Water and Sewage Works* magazine, held up a full page newspaper ad of a power company telling consumers of power rate reductions at the Savannah, Ga., meeting of the Southeastern Section of AWWA, he asked the question, "What are water works managers going to do to persuade local authorities of the present need for some increase in water rates in many localities in the face of such current rate reductions by the electric utilities?"

Possibly the experiences of the Spartanburg Public Works Commission may in part serve to answer that question and this article should to a measure answer the request of the Editor for a story on the Public Relations phase of water supply operation and management in Spartanburg.

Let's look around us and see what is being done in promoting the sale of electricity. From the bobby-sox, teen-age hair curling irons and Junior's electric razor throughout the home, throughout the office, the factory, etc., we find all kinds of instruments and gadgets to use electricity and still more being built every day that require electric current to operate.

In the water works field you do not have this voluntary sales and promotion organization. In fact, I have never heard of a water works salesman, but a great deal has been done in Spartanburg by departing from the old-time standard of routine operation and making an attempt to sell more of our products for which we have ample plant capacity.



The History of Water Supply Growth in Spartanburg Since World War I and Plant Expansion in Two Stages With the Third Projected to Increase Plant Capacity to 11 mgd.

Investigation for New Supply

In 1923, the Commissioners of Public Works authorized a supply survey for the future needs of the Spartanburg Water Works with the idea of enlargement or building a new plant. They specified in the investigation that all possible supplies be examined and, if practical, that the plant be so located as to develop as much power for pumping as possible. A report was soon brought in with the recommendation that a new 6,000,000 gallon plant and a 63 ft. head dam be built with two 500 KW. generators. This new construction was started in 1925 and the water from the new plant was turned into the city the latter part of June, 1926.

Our Power Plant

The power plant scheme, as to be expected, was criticized by the electric power company officials as being extravagant and unnecessary. For our information, a memoranda account was set up showing the total cost of the power plant at $395,000. Bonds at four and one-half per cent interest were sold. Insurance was placed on the power equipment and necessary repairs, all of which were carried on the account, and in twenty years this entire amount has been amortized and now we have a power plant in the clear that will be an asset for years to come. For instance, in the year ending June, 1944, had we purchased our electric power it would have amounted to $48,000. We sold through the rainy season $4,000 of power and through the dry season

Spartanburg's Filter Plant & Pumping Station of World War I—Capacity 3 mgd.
(This plant, which was enlarged to the 3 mgd. capacity to serve Camp Wadsworth, was operated during World War I by Ye Ed. before the coming of "Bob" Simms.)

COMPARISON OF SPARTANBURG WATER WORKS
As of June 30, 1920 vs. June 30, 1944 (World War I to World War II)

	June 30, 1920	June 30, 1944
Plant value	$ 468,244.19	*$ 3,275,225.58
Indebtedness	$ 273,502.88	$ 1,194,000.00
Water pumped per year	463,550,000 gal.	2,953,710,000 gal.
Water pumped, avg. per day	1,270,000 gal.	8,092,300 gal.
Total income	$ 129,984.90	$ 321,530.45
Income per million gallons water pumped	$ 280.00	$ 106.12
Total operating expense	$ 87,484.99	$ 226,056.53
Operating expense per million gallons of water pumped	$ 188.72	$ 76.53
*Including value charged off as depreciation and obsolescence between 1920 and 1944		$ 950,825.17

CHARGES FOR WATER SOLD ON A SLIDING SCALE RATE
As of June 30, 1920 vs. June 30, 1944

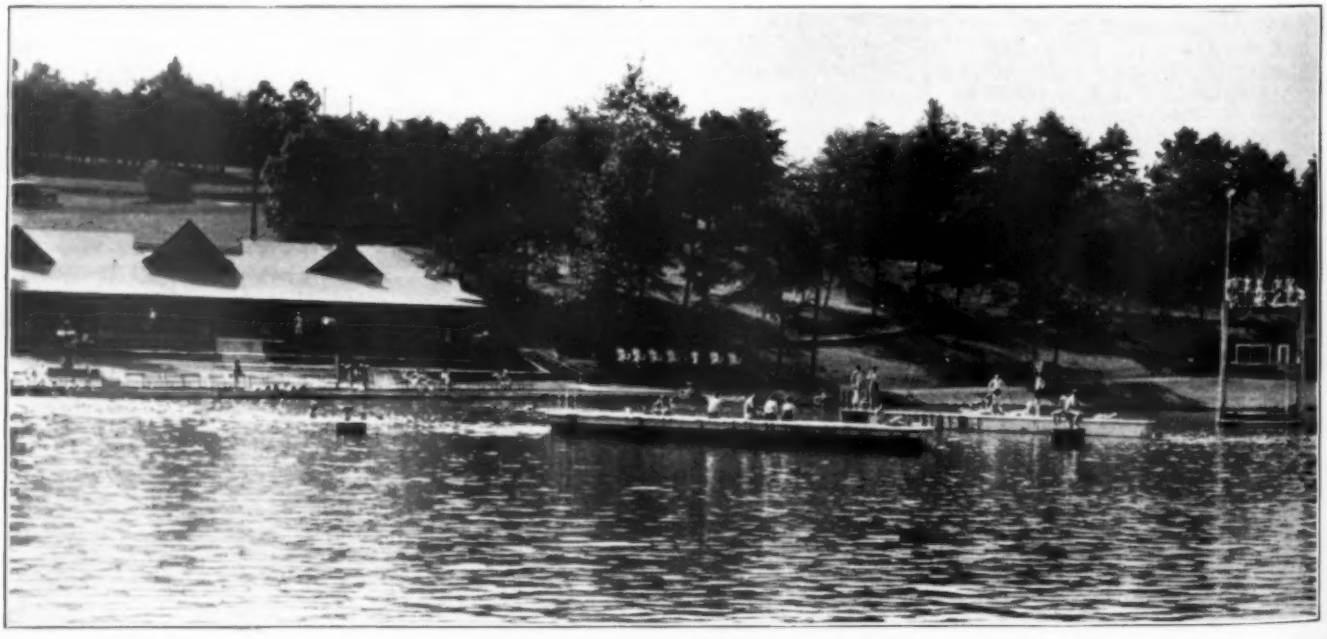
	June 30, 1920	June 30, 1944
Residences or small water consumers	50c per 1,000 gal.	25c per 1,000 gal.
Large water consumers	15c per 1,000 gal.	8.5c per 1,000 gal.

Note: Sliding scale applies to all consumers alike, according to the quantity of water used.

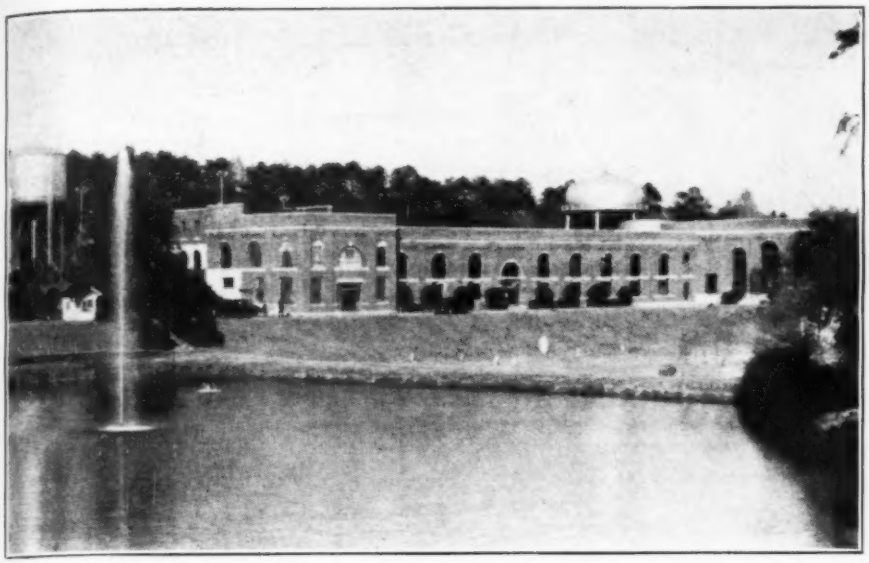
FACILITIES

	1920	1944
Water mains inside the city	50 miles*	206 miles*
Fire hydrants inside city and on city property	241	708
Fire hydrants outside city set by private interests	None	396
Meter connections	2,250	8,500

*Mains laid outside the city by private interests not included.



Spartanburg Water Work's Rainbow Lake
Where folks bathe and swim in sparkling filtered water from the adjoining plant. It's all free too.

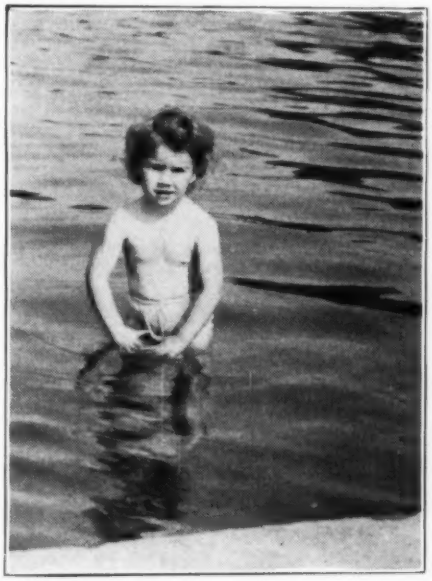


Spartanburg's Filter Plant & Pumping Station of World War II—Capacity 9 mgd. *(Quite a metamorphosis has taken place since World War I under the courageous Simms' regime and a forward looking Commission.)*

we purchased $10,000; therefore, our power only cost us $6,000 for that year—a saving of $42,000.

Wholesale and Off-Peak Water

In 1929, a textile finishing plant was located six miles from Spartanburg, one mile from what is known as the Old Camp Wadsworth area. The Water Commission entered into a contract with this finishing plant to furnish them with the necessary water at off-peak rates. The Commission was uneasy about the fire protection for the city and asked the National Board of Underwriters if it would be practical and possible to require the finishing plant to put in a three-day storage of water and cut them off at any and all times it was necessary for fire, machinery breakdown or any accident to the system. The underwriters said that this was the first time that a question of this type had been put to them, but they said that it was undoubtedly a benefit to the city to have this water ready for diversion at a moment's notice to the city rather than start the filter plant and pumps necessary to put this water in motion. The underwriters required at that time 5,000 gallons of water per minute on a ten-hour basis for the high-value district of our city; so, in making the finishing plant a rate we did not have to charge any of our plant investment or labor to this water; therefore, we figure that it is all profit beyond the actual chemicals, electricity, and small wear and tear of machinery. We made them a rate of a little over double the production and pumping cost, other than investment. They are now paying us around $3,500 per month for using from 2,000,000 to 2,500,000 gallons of water per day. The last survey the underwriters made in our city they deducted all of the water used by this finishing plant in arriving at the figure of available plant capacity for fire protection.



"Hello! Mr. Simms" *(She's 3 yr. old Sandra Holland, but she'll not always be just 3 yrs. old.)*

Outside City Water Rates and Supply

The Commissioners of Public Works made a very low rate (15 per cent in excess of city rates) to customers outside of the city limits of Spartanburg and are now selling practically 60 per cent of the water produced outside the city. This additional water sold has enabled us to make a very marked reduction in the unit cost of water produced, as shown in the comparative statement at the bottom of this article.

Public Relations and Our Rainbow Lake Project

Spartanburg being located in the red hills with practically all open ground as farm land, people were not accustomed to seeing large bodies of clear, sparkling water, and in the development of our new plant we took advantage of the natural surrounding scenery and built two small dams and developed a 4½ acre, 12,000,000 gallon, clear-water lake, a portion of which is used for swimming. The water for this lake is taken from the gravity overflow of the clear well under the filter plant. It costs only that for the chemicals, which runs from $2.00 to $5.00 per million gallons, since this water does not have to be pumped.

This lake is surrounded by hills with a virgin forest and all of the development has been to bring out nature rather than the artificial development of man. In other words, the picnic pavilions, barbecue stands, etc., are built into the banks with native materials as far as possible.

This lake is 13 miles from the center of the city, but on Sundays and holidays the crowds run from 5,000 to 7,500, and each day in the week from 1,000 to 1,500. There are four covered picnic pavilions with any number of tables and 25 individual groups of picnickers per night is no uncommon occurrence. The Commission entertain in this way from 125,000 to 150,000 people each year, catering to schools, Sunday schools, church picnics, and civic organizations. It has been the most popular movement of any description made in our city in the last quarter of a century. Everything is free on the grounds except what is actually purchased. In other words, there is no charge for swimming or use of the pavilions. The concession man pays approximately $1,000 for the concession and the average cost to the Commission for the operation per year will run approximately $1,200, outside of the original cost.

$1,000,000 Bond Issue for New Water Plant at Sturgis?

According to present plans, the city of Sturgis, Mich., will place the $1,000,000 revenue bond issue defeated at the November, 1946, elections, up for a vote again in the coming April city election. The proceeds of the issue will be used to finance the building of a new municipal water plant.

"SHORTAGE ENGINEERING"

Or the Story of a Shortage that Proved to be a Blessing in Disguise

By H. W. POSTON
Ass't Chief Engr. and Sup't
DEPT. OF WATER
KANSAS CITY, MO.

IN the present period of scarce materials one answer to problems has been to pay higher prices, obtaining them at a premium. Kansas City has found another way out.

With only a month's supply of ammonium sulfate on hand, word was received from our supplier that due to the coal strike ammonium sulfate would no longer be available. Ammonium sulfate being a by-product of coke production in the steel industry, the company would be unable to meet its commitments.

In looking for a solution to this situation, eliminating ammonium sulfate from our water treatment process was tried. The result was chlorinous tastes in our finished water. Other sources of ammonia were anhydrous ammonia and ammonia liquor. The latter was decided on because of cost and its adaptability to quick installation.

A second-hand steel storage tank could be obtained. Iron piping and valves, while not plentiful, were available. A variable-rate solution feeder could be quickly constructed.

A plan was drawn, tank foundation poured, piping and tank installed in three weeks. The order for the ammonia liquor was given to the Spencer Chemical Co. located in Pittsburgh, Kansas. Here a converted war plant makes anhydrous ammonia for industrial purposes, and has recently installed equipment for providing ammonia liquor, produced from ammonia gas and water.

Advantages in the Use of Aqua Ammonia

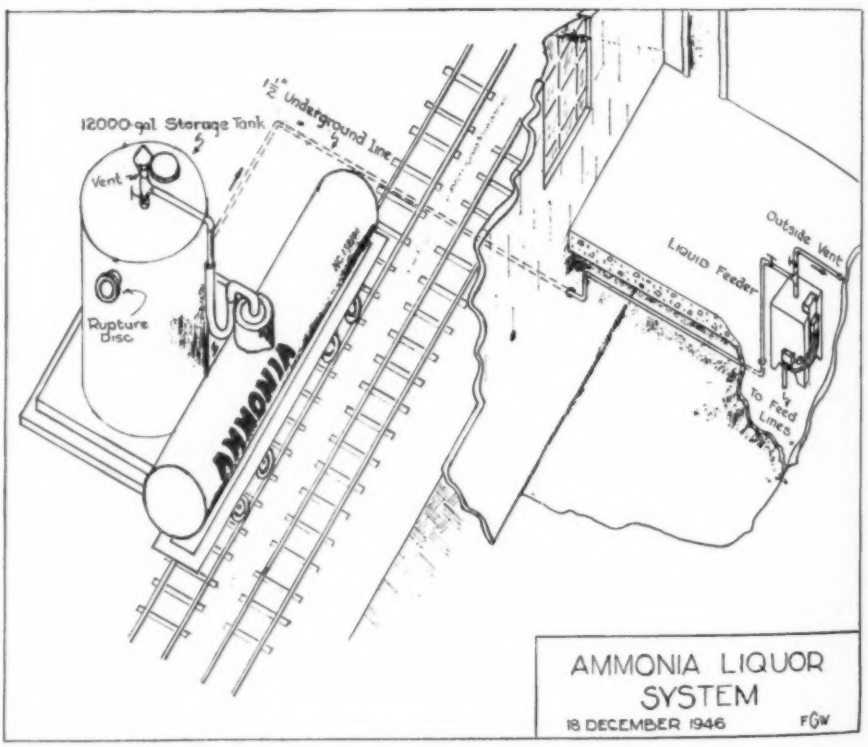
The advantages of this new equipment are cost, simplicity, and a chemical with no extraneous material. There are no sulfate ions added in the treatment to convert carbonate hardness to non-carbonate hardness. In our softening process this must be removed by the addition of soda ash. Aqua ammonia contains only ammonia, the active chemical in water treatment, and water.

Cost of unloading the ammonia liquor will be decreased since the tank car of liquor can be unloaded with air, whereas ammonium sulfate was unloaded by manpower from box cars. The cost of ammonia liquor is approximately $70 per ton of available ammonia as compared to $150 per ton of available ammonia when purchased as ammonium sulfate.

The ammonia liquor is readily adapted to feeding through any type of liquid feeder and can be stored under any temperature condition.

Cost of the new equipment will be paid for by savings from the first year's operations.

The accompanying sketch shows how our ammonia liquor is stored and piped to the variable rate solution feeder of the Omega type, with the dropping takeoff which can be set for any desired fixed rate of emptying the solution tank, or can be automatically operated to secure increasing emptying rates with increasing flows.



New Aqua Ammonia System—Kansas City, Mo.

Anderson, Ind., Abandons Polluted River Supply

Work has started on the development of a completely new water supply system for Anderson, Ind. The new system replaces the use of water drawn from White River and consists of the sinking of four 30-foot shafts in the Killbuck Creek basin at a cost of $400,000. Completion is scheduled for this year. The present city water works will be used to pump water from the new source.

1¼% Revenue Type Water Bonds Sell at Premium

Evansville, Ind., has sold a $600,000 revenue water works bond issue to the First Boston Corp., Chicago Branch, at 1¼ per cent interest.

Not alone is the low interest rate on this revenue type bond of interest, but likewise the fact that these bonds sold at a premium of $10,647 on the $600,000 issue. As far as this magazine is aware, revenue type water bonds have never before been sold at a more favorable price.

HYDRAULICS FOR THE PRACTICAL WATER WORKS MAN

The Seventh of a Series of Articles

Design of Discharge Openings in Tanks and Reservoirs

By ROBERT W. ANGUS, M.E.
Consulting Engineer
TORONTO, CANADA
(Professor Emeritus of Mechanical Engineering, University of Toronto)

INASMUCH as we have been discussing an overflow, and incidentally the effect of the entry end on the discharge, this is probably the best place to deal with the drainage outlet openings for tanks and reservoirs and the best design for them. Only round openings are considered, as this is the most usual shape.

Liquids may be discharged from tanks through various types of openings, and following the order used in the article discussing the overflow, we may present these openings, illustrated in Fig. 25. First there is the short piece of smooth pipe which has not been well fitted into the bottom but projects up into the tank as shown at (a). At (b) in Fig. 25 is shown an opening of the same character but carefully fitted so that the top of the pipe is just flush with the inside bottom of the tank. In both of these cases the burrs are supposed to be removed from the inside of the pipes, and the ends of them are cut off smoothly and square, but there has been no rounding of any of the corners.

A better construction is the bell mouth entrance shown at (c). This need not be expensive construction, although its efficiency depends on the care taken in forming the bell-mouth and in making it smooth. It is sometimes made of only the part above the line BB, and sometimes the pipe below is added, so we shall examine both cases later. It is usually set flush with the bottom of the tank, as shown in the drawing, but it is almost as effective if used on top of the design (a) or (b), in which case it would, of course, project up into the tank. The orifice (d) is the cheapest and, unfortunately, is very common; it consists of a smooth circular hole bored in the bottom of the tank, with the burrs around it removed but with the corners left sharp. The orifice has smaller capacity than any of the other designs shown.

The Author

For the designs (a) and (b) the effectiveness is almost completely lost unless the length of the pipe is from three to four times its internal diameter, whereas the bell-mouth (c) has no such limitations. The reason for this is that in the first two cases the water first suffers a marked contraction near the top of the pipe, but if the pipe is long enough the stream will again expand and completely fill the discharge end in the way shown on the drawing.

For the orifice (d) the stream contracts until its area is almost 62 per cent of that of the orifice, which means that the diameter of the stream is 79 per cent of that of the opening. The stream bears the classical name of the *vena contracta*, or contracted vein, and has been the subject of very many studies and experiments. The minimum diameter of the vein is reached at a distance of about half the orifice diameter away from the face of it and the stream then remains uniform in size till the air resistance breaks it up. When the orifice is in the vertical side of a tank and the water in the latter is clean and free from turbulence, the stream looks like a clear glass bar, being fixed in position but gradually bending downward in a graceful curve under the action of gravity.

The frictional losses in the stream from the orifice are only about three per cent of the head of water above the center of the orifice or three per cent of the velocity head in the contracted stream. It is evident that if a gage could be placed in the stream in such a way as to measure the pressures, then at the orifice the gage would read higher than it would in the contracted vein, since the decrease in area produces an increase in velocity which will correspond to a fall in pressure. The remaining arrangement, shown at (e) in Fig. 25, is made up by attaching a conical end, instead of a uniform pipe, at BB below the mouth-piece shown at (c), but the angle at the cone must not much exceed about six degrees or the stream will not expand fast enough to keep the cone full and the stream probably will pass through as shown at (f), where the conical extension might just as well be dispensed with. The cone shown at (e) has an angle of five degrees between its side and will, therefore, require a length of 69 inches to give it an outlet diameter of 12 inches. The outlet end must be submerged for effective action.

An effort has been made to show a similar set-up for each design, but this is not entirely possible, although the comparative merits of the different designs will be clear. In each case it is assumed that the depth of water over the entrance is sufficient to prevent air from being drawn from the water surface down through the center of the opening, and for the cases shown this depth has been taken as 2 ft., although it could be much less without causing trouble. The discharge pool has been taken at 2 ft. below the tank, but this is only of interest in connection with design (e) as the surface only needs to be clear of the tubes in the other cases. The minimum diameter is 6 in. in each case. We have already examined three of these designs in connection with the discussion of overflows so that it is not necessary to discuss them at great length.

Inward Projecting Pipe

For this form, shown at (a) Fig. 25, the entrance loss has already been given as about 80 per cent of the velocity head, which includes the entire length of this short pipe. Taking the datum at the water surface in the pool, we may write the elevation head of 4 ft. of a pound of water at the surface in the tank, where there is neither pressure nor velocity, as equal to the velocity head at exit from the pipe, plus the loss, a

Standard End

For the design shown in Fig. 25 (b) and often referred to as the standard end, the equation may similarly be written:

$$4 = \frac{V^2}{64.3} + \frac{0.5\ V^2}{64.3}$$

since the loss, in this case, has already been given as half the velocity head at the discharge end, and from this the value of V is 13.1 ft. per sec., which means a flow of 1155 gal. only the mouth-piece, the pipe below BB being omitted, and the second with this pipe being included. Where the mouth-piece alone, without the extension, is used, the loss has already been given as 10 to 20 per cent of the velocity head and we shall assume that the work is so smooth that the lower value will apply. Then

$$2.25 = \frac{V^2}{64.3} + \frac{0.10\ V^2}{64.3}$$

from which the discharge velocity is

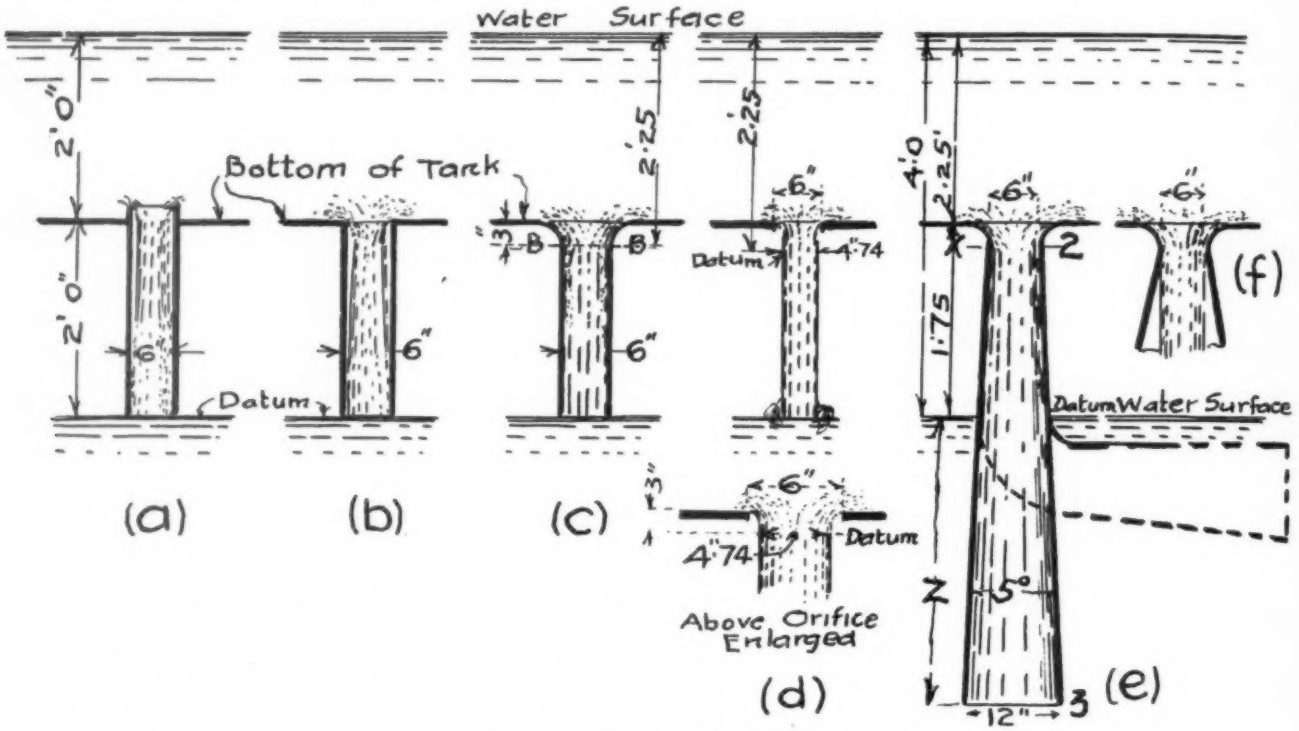


Fig. 25. Various Types of Discharge Openings
(Top edges in (a), (b), and (d) are sharp but with burrs removed.—Pipes and orifices are circular.)

statement which is true because there is no pressure at the exit end and the elevation head is evidently zero. We may, therefore, write:

$$4 = \frac{V^2}{64.3} + \frac{0.8\ V^2}{64.3}$$

from which V, the velocity at the discharge end, is easily found to be 11.95 ft. per sec., and Table I shows this to correspond to a discharge of 1055 U. S. gal. per min.

per min., and this is practically 10 per cent higher than in the former case.

Bell-Mouth End

It is a little difficult to make a fair comparison of the bell-mouth end shown in Fig. 25 (c) with the former pair because there is not the same inherent reason for having the pipe below the line BB. Let us then make two calculations, the first with

found to be 11.45 ft. per sec. and the discharge 1010 gal. per min., the least of the three.

Let us now see the effect of adding 21 in. of uniform size pipe below the line BB, attached with water tight joint there and with the lower end of it level with the pipes in the cases (a) and (b) as shown at (c) Fig. 25. In this case we must add the loss in this 21 in. length, small though it is, because the entry loss does not include it. In the cases (a) and (b) the entrance loss includes a length of four pipe diameters and in figuring the overflows we should have made allowance for this, but in longer pipes its effect is so small that it is generally neglected. For this short pipe, however, each loss must be carefully included and that loss in this 21 in. of 6 in. pipe will be given by the formula

$$\frac{fl}{d} \times \frac{V^2}{64.3}$$

TABLE I

Velocities in Pipes

Pipe size (in.)	Actual diam. (in.)	Area (sq. ft.)	Velocity ft. per sec. for 100 U. S. gal. per min.	Pipe size (in.)	Area (sq. ft.)	Velocity ft. per sec. for 1,000 U. S. gal. per min.
1	1.049	.00600	37.1	4	.0873	25.50
1¼	1.25	.00852	26.2	6	.1963	11.33
1½	1.50	.01227	18.2	8	.349	6.37
2	2.067	.0233	9.6	10	.545	4.07
3	3.068	.0513	4.3	12	.785	2.83

1,000 U. S. gallons per minute = 1.44 million gallons per 24 hours. One cubic foot per second (1 cfs.) = 450 U. S. gallons per minute (450 gpm.)

where the value of f is close to 0.022, from Table II, and l is 1.75 ft., and since d is 0.50 ft., the loss in this piece works out to 0.08 times the velocity head. Writing out the equation for the combined mouth-piece and pipe gives

$$4 = \frac{(0.1 + 0.08 + 1)\ V^2}{64.3}$$

or the discharge velocity is 14.75 ft. per sec. and the discharge of 1300 gal. per min. is a decided improvement over the former designs. The cost of it is not necessarily high.

Circular Orifice

If the discharge opening is just a hole 6 in. in diameter bored through the bottom plate of the tank and the burrs are removed, but the corners are not rounded, the stream will take the circular orifice form shown at (d). There is a contraction of the jet, as stated before, and the minimum diameter of 6×0.79 or 4.74 in. is reached about 3 in. below the inside bottom of the tank. The pressure in the jet is atmospheric just where the diameter of it becomes constant and is at the place shown in Fig. 25 (d). The loss up to this point is equal to

$$\frac{0.03\ V^2}{64.3}$$

V is the velocity in the smallest part of the stream, where the diameter is only 4.74 in. and the area 0.122 sq. ft. Following the method used for the other designs it is possible to write

$$2.25 = \frac{V^2}{64.3} + \frac{0.03\ V^2}{64.3}$$

which gives the velocity in the contracted jet as $v = 11.85$ ft. per sec. The discharge is, of course, found by multiplying this velocity by the area 0.122 sq. ft., which gives 1.446 cu. ft. per sec., or 650 gal. per min., which is the smallest of all. This is rather curious when the small loss is considered, but the reduction in the area of the stream more than counteracts its other advantages.

Effect of the Conical Piece

We have already seen the advantage of adding a piece of uniform sized pipe below the mouth-piece and shall now study the effect of adding a conical piece so as to make the shape shown at (e) Fig. 25. If this is to be effective then, as already stated, the angle of the cone must be small enough so that the water will expand at a sufficient rate to keep the pipe full from end to end, for if the cone angle is too great, the active part of the stream of water will run down the center of the cone as shown at (f) in Fig. 25, in which case the cone is of little service. An angle of five degrees between the sides is shown here at (e), and if the outlet diameter of the cone is 12 in., the length of it must be 69 in., but if this is too long to place vertically, little harm will be done by constructing it with a right-angled bend, as shown dotted. In either case care must be taken to see that the discharge end is fully submerged.

Taking the datum at the lower water surface, we have

$$4 = -z + z + \frac{V_3^2}{64.3} + F$$

and in calculating F we notice that the whole tube is made up of the bell-mouth entrance, in which we have already taken the loss as

$$\frac{0.10\ V_2^2}{64.3}$$

and the conical part, in which the loss should not exceed

$$\frac{0.04\ V_2^2}{64.3}$$

and these two together give the total value of F as

$$\frac{0.14\ V_2^2}{64.3}$$

Inasmuch as the throat diameter is half that at the outlet, the corresponding area is one-quarter of the outlet area, and the throat velocity will be four times that at the outlet, that is, $V_2 = 4V_3$, and also, of course, $V_2^2 = 16V_3^2$. Placing these values in the equation

$$4 = \frac{V_3^2}{64.3} + F$$

gives

$$4 = \frac{1}{16} \times \frac{V_2^2}{64.3} + \frac{0.14\ V_2^2}{64.3}$$

from which the throat velocity V_2 is found to be 35.6 ft. per sec., and the corresponding discharge is 3140 gal. per min. This much exceeds that from any of the other designs.

The conical extension is, therefore, most valuable and the reason will become clear if we calculate the pressure at the throat. Taking the datum at the lower water surface, we have

$$4 = 1.75 + p + \frac{V_2^2}{64.3} + F$$

and since V_2 is 35.6 ft. per sec., then $\frac{V_2^2}{64.3}$ is 19.7 ft. and the value of F is 0.10×19.7 or 1.97 ft., which is the loss down to the throat. Hence, $4 = 1.75 + p + 19.7 + 1.97$, or p is -19.42 ft., showing that there is a vacuum of 19.42 ft. at the throat.

TABLE II

Friction Factors for Smooth, Clean, Coated Cast Iron Pipes

(Add 5% for riveted steel and at least 50% for old rusted pipes. Copper and brass and lead pipes have lower values.)

Pipe Diameter in.	Velocity in Pipe, Ft. per. Sec.					
	1.0	2.0	3.0	4.0	5.0	10.0
1	.035	.032	.030	.029	.027	.024
2	.033	.030	.028	.027	.026	.024
4	.031	.028	.026	.025	.025	.023
6	.029	.026	.025	.024	.024	.022
12	.025	.023	.022	.022	.021	.020
16	.023	.022	.021	.021	.020	.019

Therefore, with the expanding cone the pressure forcing the water through the bell-mouth part is 2.25 ft., and the water is above the throat, plus the suction of 19.42 ft., giving a total head on this part of 21.67 ft. as compared with only 2.25 ft. if the cone is not attached. Examination of the method of calculation will show that for this mouth-piece the discharge varies with the square root of the head and hence

$$\frac{\text{Discharge with conical extension}}{\text{Discharge without extension}} = \sqrt{\frac{21.67}{2.25}} = 3.105,$$

which is just the ratio of the two discharges 3140 and 1010 gal. per min. which we found.

If we assemble the results of this study, the following results:

Design See Fig. 25	Inward Projecting (a)	Standard End (b)	Bell-Mouth Entrance (c)		Orifice (d)	Bell-Mouth with Cone (e)
			No Pipe Attached	With Pipe Attached		
Discharge U. S. gal. per min. ..	1055	1155	1010	1300	650	3140

This study shows that with the same sized 6 in. opening in each case the capacity to carry away water varies enormously with the design. Evidently the time required to empty the tank may be greatly reduced by careful design of the outlet and in cases of old tanks, where it is necessary to speed up the process and it

is not possible to increase the opening in the tank, then some of the designs examined may be useful. It should be noted that in cases of designs (a) and (b) if the length of the pipe is less than about four diameters, the expanding water will not fill the bottom end of the tube and the net effect will be the same as if the orifice shown at (d) is used. The conical tube is very helpful and has been successfully used, but it must be remembered that when the tank is nearly empty, air will be drawn down from the water surface in all of these designs and the method of calculation does not hold good then.

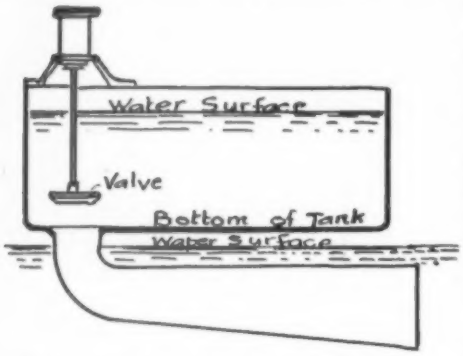


Fig. 26. Tank Fitted with Bell-mouth and Conical Expansion Extension (*Valve operated by hydraulic cylinder*)

If it is desired to speed up the discharge from a tank with an orifice (d) without enlarging the hole, obviously this may be done by placing a bell-mouth above it and a conical piece below it, making sure that the inside surface is left smooth and clean. If the discharge opening is to be closed and opened, some type of valve must be used on it, and obviously any ordinary type of gate valve would offer a great deal of resistance and very largely nullify the effect of an otherwise good design. In a number of instances the writer has used flat disks with rubber faces and so designed that they may be lifted vertically away from their seats, thus leaving the opening free for the water to enter. The disk may be lifted by lever or by means of a hydraulic cylinder, and a diagram of the latter type applied to an opening with an expanding cone is shown on Fig. 26.

English, Ind., to Have New Water System

It is reported that English, Ind., is planning to buy the existing water system and then replace it with a completely new system at an early date.

Burns & McDonnell Expand

Institute Profit Sharing Policy

Left to Right: Front Row: R. E. McDonnell, C. A. Smith; Back Row: C. K. Mathews, E. J. Thomson, R. H. McDonnell, A. F. Hartung, R. G. Kincaid, R. L. Baldwin.

Burns & McDonnell Engineering Co., now in its 49th year of consulting engineering service, has expanded from four members to eight. To the present four, R. E. McDonnell, C. A. Smith, R. L. Baldwin and R. H. McDonnell, have been added Arthur F. Hartung, electrical engineer; Russell G. Kincaid, civil and hydraulic engineer; C. Kelsey Mathews, civil engineer; and Earl J. Thomson, electrical engineer. These men have been with the company from 11 to 24 yrs.

Of interest also is the profit sharing policy adopted by the firm on Jan. 1, 1946. The profit sharing plan applies to the entire organization of 75 employees. The company is building a new office building at 51st and Brookside Blvd., Kansas City, Mo.

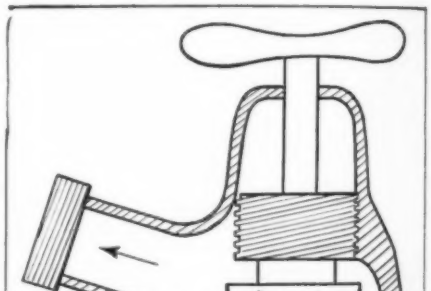
A Case of Substitute Equipment*

In Which House Pipe Vibrations in a Whole Neighborhood Were Traced to a Single Faucet Washer

House pipe vibrations that caused water and plumbing officials no end of phone calls and complaints over a period of a week were traced to the washer in one faucet. All of the 28 houses on a 2-in. supply loop reported periodic vibrations of the piping in them to such an extent that the owners were fearful lest plaster and other parts of the house might be shaken loose, not to speak of the annoyance caused by the noise.

Upon asking questions at the various houses, it was learned that the vibrations had not started until a small portable concrete block plant had been put into operation, where a new house was under construction. In the front yard of this property was a faucet that was being used in order to get water to run the concrete block plant. The faucet would be opened at intervals all through the day. It was during some of these times that the residents of the development would experience the vibrations. Slight openings of the faucet caused more trouble than wider openings.

When the faucet (a sill-cock) was gone into, it was found that the washer was one with square edges. When these edges were beveled off with a knife and the faucet put back into use, the vibration was completely eliminated. The square edges at the bottom of the washer were caused to flutter or vibrate when the faucet was partially opened, and this was transmitted on to the piping over the whole development.


THE SQUARE EDGED WASHER FOUND TO BE THE CAUSE OF THE VIBRATION OF HOUSE PIPING IN A WHOLE NEIGHBORHOOD. WHEN WASHER WAS BEVELED AS SHOWN BY DASHED LINES, THE VIBRATION NUISANCE CEASED.

The Faucet Responsible for Disturbing a Whole Neighborhood

A sketch of this faucet is shown. It is the type commonly used as a boiler drain or as a sill-cock and probably never would have been used for this duty had plumbing materials been more plentiful.

*Contributed by A. B. Uzzle, Jr., Asst. Supt., City Water Dept., Raleigh, N. C.

"Bill" Streit Appointed Gen'l Mgr. Terre Haute Water Corp.

William H. Streit, Bristol, R. I., has been appointed general manager of the Terre Haute, Ind., Waterworks Corp., effective Feb. 15, upon the retirement of E. A. Geehan, who has held the job 23 years.

FIFTY YEARS PROGRESS IN PUMPING*

By H. GARTMAN
Asst. Chief Engr.
CENTR. PUMP DIVISION
DE LAVAL STEAM TURBINE CO.

MAN has used pumping machinery of one kind or another for thousands of years for moving water, and the water pump may be considered one of the oldest mechanical contrivances.

The Author

The same cannot be said of the centrifugal pump with which this paper is mainly concerned, although it is no youngster by any means. The original pump resembling the present day pump was, it is generally believed, first designed and constructed in the United States more than 100 years ago. This so-called Massachusetts pump (Fig. 1) was built in 1818 and may be considered the forerunner of the modern centrifugal pump. The design of the casing is similar to that of the modern pump, although the impeller is only a radial vane paddle wheel. In 1846 Andrews brought out a centrifugal pump with an impeller of the closed type with backwardly curved vanes (Fig. 2), so we can properly at this time celebrate the 100th anniversary of the modern centrifugal pump.

The centrifugal pump has been in general use for the last fifty years, and in water works pumping plants during the last thirty years or so to the exclusion of any other kind of pump. This development went hand in hand with that of the steam turbine. In 1882, Dr. Gustav De Laval invented the first practical steam turbine, realizing early the advantages of driving centrifugal pumps with steam turbines. Both machines are inherently high speed units and are ideally adaptable to each other, the combination giving a light weight, efficient unit.

The De Laval Company began building centrifugal pumps and steam turbines in the United States in 1901. The following figures show the total capacity of centrifugal pumps supplied to municipal water works at successive periods by the De Laval Steam Turbine Co.

Year	Total Capacity (Mgd.)
1907	25
1910	150
1915	1,350
1920	3,500
1930	14,000
1940	17,900
1945	18,300

As with anything new, it took time in selling the centrifugal pump idea to water works engineers. But, as can be seen from the above figures, the application of centrifugal pumps in the water works field has increased tremendously during the last thirty years, and with this increase in use there has naturally been progress, not only because of experience gained by the manufacturers but also as a result of extensive research and a better understanding of hydraulic laws. Closely linked with the centrifugal pump is its driver, and some reference will be made below to the development of the latter, particularly the steam turbine, as affecting the overall efficiency of the plant.

Progress in Mechanical Construction

Comparing the mechanical construction of a pump built thirty years ago with an up-to-date unit, there are not immediately evident any radical differences in the design of the two. However, there has been continuous progress in impeller and casing design with a view of improving efficiency.

Bearings and particularly thrust bearings have been improved and the shaft design has kept step with the additional loads imposed by higher heads per stage employed now as compared with earlier practice.

On small and medium size units, the tendency has been to go to ball bearings and, where properly applied, these bearings have been uniformly successful.

The majority of couplings used in water works service where speeds are relatively low are still of the rubber bushing type. On some of the recent installations, all steel gear tooth type couplings have been used. Both types will give years of satisfactory service and the selection is more or less dictated by individual preference.

Pump packing has been improved, thanks mainly to the cooperation of packing manufacturers with pump builders in developing suitable packing for all services.

During the last few years considerable experimentation has been done by pump manufacturers and packing manufacturers in the development of mechanical seals for centrifugal pumps. A number of pumps with seals of this type have been in successful operation for several years for more or less special application. In the small and medium size pump, it is quite possible that the future will bring a perfected mechanical seal for standard water pumps that will operate for months without any attention whatever, reducing the already low maintenance cost of pumping units still further.

Progress in Pump Construction Materials

In view of the almost complete absence of difficulties with the materials in the early water works pumps, there have not been too many changes in the materials used for the modern centrifugal pump except for special applications. Instead of ordinary cast iron, the casing material may now be semi-steel, which is obtainable in tensile strength of 45,000 psi. or over. Government bronze (88-10-2) is still widely used for impellers and wearing rings and carbon steel shafts are more or less standard.

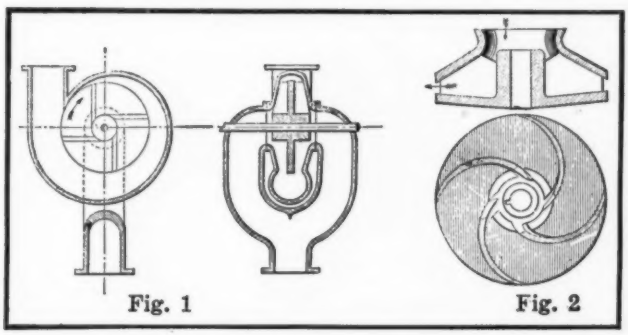


Fig. 1 Fig. 2

Fig. 1. So-called Massachusetts Pump (1818)
Fig. 2. Andrew's Centrifugal Pump (1846)

*A paper presented before the Penna. Water Works Assn. and here printed by permission of the association.

The majority of shaft sleeves are still made of bronze. However, particularly for gritty water, hard, stainless steel sleeves of the 11-13 per cent chrome type are often furnished, although they are considerably more expensive. A word of caution may be inserted here against specifying 18 per cent chrome–8 per cent nickel steel for this service. While this steel has very good corrosion resisting qualities, it is not suitable for shaft sleeves due to its seizing characteristics.

Progress in Operating Characteristics

Under operating characteristics may be considered improvements in the operation of centrifugal pumps with respect to noise and cavitation. Almost the only complaints that a manufacturer receives concerning the operation of a water works pump relate to noise and cavitation which often results in wear of the impeller. Based upon experience and research, such difficulties can almost without exception be traced to a speed too high for the service condition. The maximum speed at which a centrifugal pump may operate with freedom from cavitation and noise is determined by capacity, head and suction conditions. Progress was made some years ago toward overcoming this evil through the general acceptance by centrifugal pump builders of the principle that centrifugal pumps should not be operated above certain maximum speeds. These maximum speeds are furnished in the Standards of the Hydraulic Institute as a function of total head and maximum suction lift and are now generally accepted by consulting engineers and users of pumps (Fig. 3).

Thirty years ago single stage pumps were seldom used for heads greater than 100 to 125 ft. Today heads of 250 ft. or more are obtained in a single casing, resulting in a more compact and less costly unit and at the same time having better efficiency.

The characteristic curve of a typical centrifugal pumping unit is shown in Fig. 4. The head when operating at constant speed rises gradually from the rated conditions when the capacity is reduced as shown on curve A, and curve A shows the corresponding horsepower. In most pumping applications, when pumping at less than the rated capacities, the head will be constant or will even reduce slightly. Curve C in Fig. 4 shows the horsepower required for a unit designed for a maximum capacity of 17,350 gpm. against 325 ft., but operated at variable speed to give a constant discharge head of 300 ft. It will be seen that there is a considerable horsepower saving for the variable speed operation.

This is just one reason why steam turbine drive for water works pumps is still attractive, as a turbine driven unit can be operated at variable speeds to suit the head requirements with a resultant saving in horsepower.

This horsepower saving can be realized to a certain extent for motor driven units by using a variable speed hydraulic coupling between the motor and the pump. (See curve B, Fig. 4.) For an installation where two pumps are operating in series, still greater savings in combination with reduced first cost will be realized by installing the hydraulic coupling between the two pumps. Fig. 5 shows diagrammatically an arrangement of this kind.

Priming Centrifugal Pumps

All centrifugal pumps that take their suction from a supply located below the pump must be primed before starting by removing the air in the pump, usually by some vacuum producing device. While space does not permit a description of all priming devices available, it should be of interest to describe a novel, automatic priming system developed by the De Laval Steam Turbine Co. and shown in Fig. 6 for a single pump. A priming chamber is mounted above the pump connected to a small motor driven vacuum pump. Two electrodes in the priming chamber control the vacuum pump and a solenoid valve in the line from the tank to the vacuum pump. When the unit is put into service, the vacuum pump evacuates the suction line and the pump casing. As soon as the upper electrode has been submerged, the solenoid valve is closed and the vacuum pump is stopped. The main unit can now be started either manually or

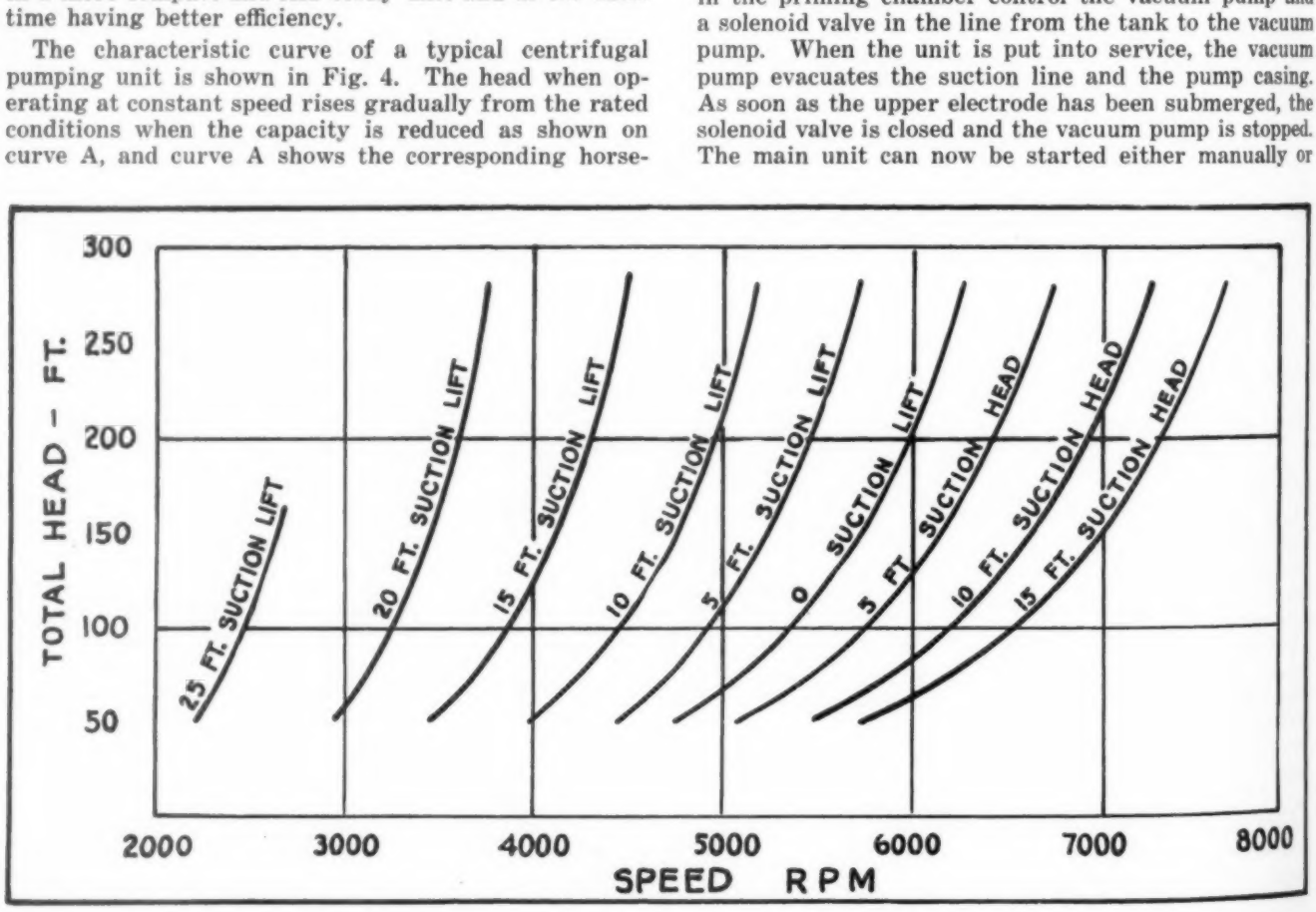


Fig. 3. Maximum Speeds as a Function of Total Head and Maximum Suction Lift

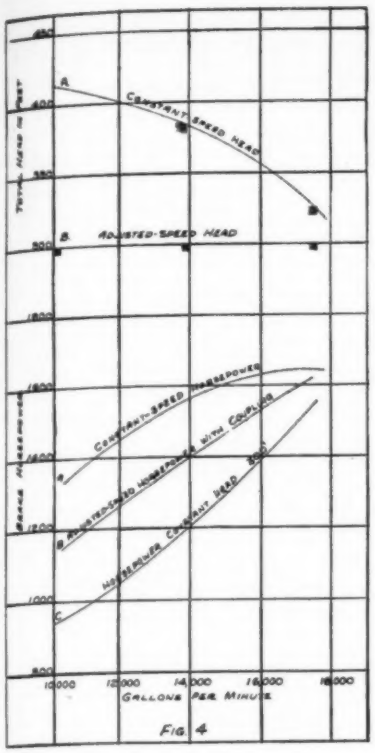


Fig. 4. Characteristic Curve of Typical Centrifugal Pumping Unit

automatically. The water level in the vacuum tank is maintained at all times even when the unit is shut down by the action of the electrodes which start the vacuum pump at once should the lower electrode become uncovered for any reason.

Fig. 7 shows an automatic priming system of the central type suitable for any number of pumping units in a station. A central vacuum tank is maintained under vacuum by one or two vacuum pumps at all times. Each of the pumps is equipped with a priming chamber with two electrodes and a solenoid valve in the line to the common vacuum tank. With this arrangement, once the central vacuum tank is in operation, all pumps will be primed at all times and ready for operation, even if the individual pumps operate at different suction lifts.

Efficiency

The greatest strides in centrifugal pump progress during the last twenty-five years have been made with regard to efficiency. Thirty years ago an efficiency of 80 per cent was considered very good, even for a comparatively large water works pump, while today a water works engineer expects and is able to purchase pumps having efficiencies close to 90 per cent. Efficiencies even above 90 per cent have been obtained on accurate field tests on large units.

Since the life of a water works pump is ordinarily much greater than twenty years, many old pumps now in operation should without question be replaced on account of possible improvement in efficiency. These old pumps in many cases require repairs or replacement of parts, the purchase price of which could be better applied to the cost of a new and efficient pump.

During the past thirty years improvements in efficiency have been made not only in centrifugal pumps but also in the driver, such as the electric motor and the steam turbine. The efficiencies of electric motors have not been improved as much as have those of centrifugal pumps. However, extremely high motor efficiencies are now being obtained even from comparatively small motors. For instance, efficiencies from 95.5 up to 97 per cent have been obtained from synchronous motors in sizes from 400 horsepower to 1800 horsepower.

The efficiencies of steam turbines have improved very materially during the past thirty years. In addition to this, steam pressure and temperatures have been increased.

In 1913 the first large turbine driven water works pump was installed in the Ross Pumping Station, Pittsburgh. In the official acceptance test, it developed a duty which then established a record of 119,540,590 ft. lb. per 1000 lb. of steam when delivering 101.935 mgd. against a head of 58.76 ft. and using steam at a pressure of 151 psig.

In 1927 a similar unit was installed in the same station, the pump being designed for the same capacity and head but the steam conditions being changed to 315 psig. and 200 deg. F. superheat. This unit developed 183,900,000 ft. lb. per 1000 lb. of steam, a gain of about 54 per cent over the original unit. While the better performance is partly due to the better steam conditions, there is nevertheless an increase in Rankine cycle efficiency of the turbine of approximately 14 per cent.

In 1938 a turbine driven pumping unit was installed at the Springfield Station, Chicago. The acceptance test showed a duty for the unit of 222,300,000 ft. lb. per 1000 lb. of steam when delivering 80 mgd. against a head of 167 ft. and using steam of 175 psig. and 150 deg. F. superheat.

These examples show the steady progress in the performance of turbine driven pumping units.

Up to about fifteen years ago the majority of centrifugal water works pumps of more than 500 horsepower size were driven by steam turbines, but the last few years have seen a growing tendency to install electrically operated pumps, even for power requirements of 2000 horsepower and above, and a few Diesel engine driven water works pumps have also been installed. Where rates for electric power are extremely low, electrification may be economical but each case should be decided on its merits.

In comparing steam turbine drive with electric operation, the greater flexibility of the former is often lost sight of. As stated before, in water works service, particularly with direct pumping, there often exists appreciable variations not only in the capacity but also in the pressures required. On account of the necessity of having spare units, it is not always practicable to split up the maximum pumping requirements into several units designed for widely varying conditions, and it is in such cases that the turbine driven unit, on account of the possibility of varying the speed without seriously affecting its efficiency, makes by far the best combination. Efficiencies at partial load and capacity have in recent years been improved, both of steam turbines and of centrifugal pumps, so that good economy is being obtained over a wide range of capacity and head.

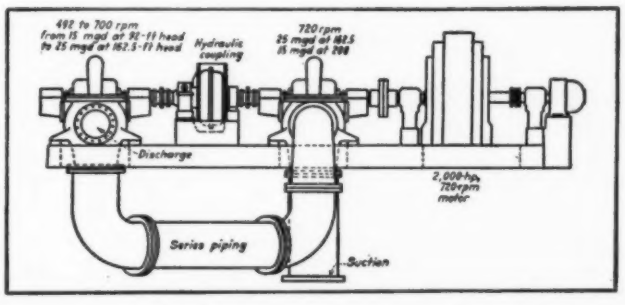
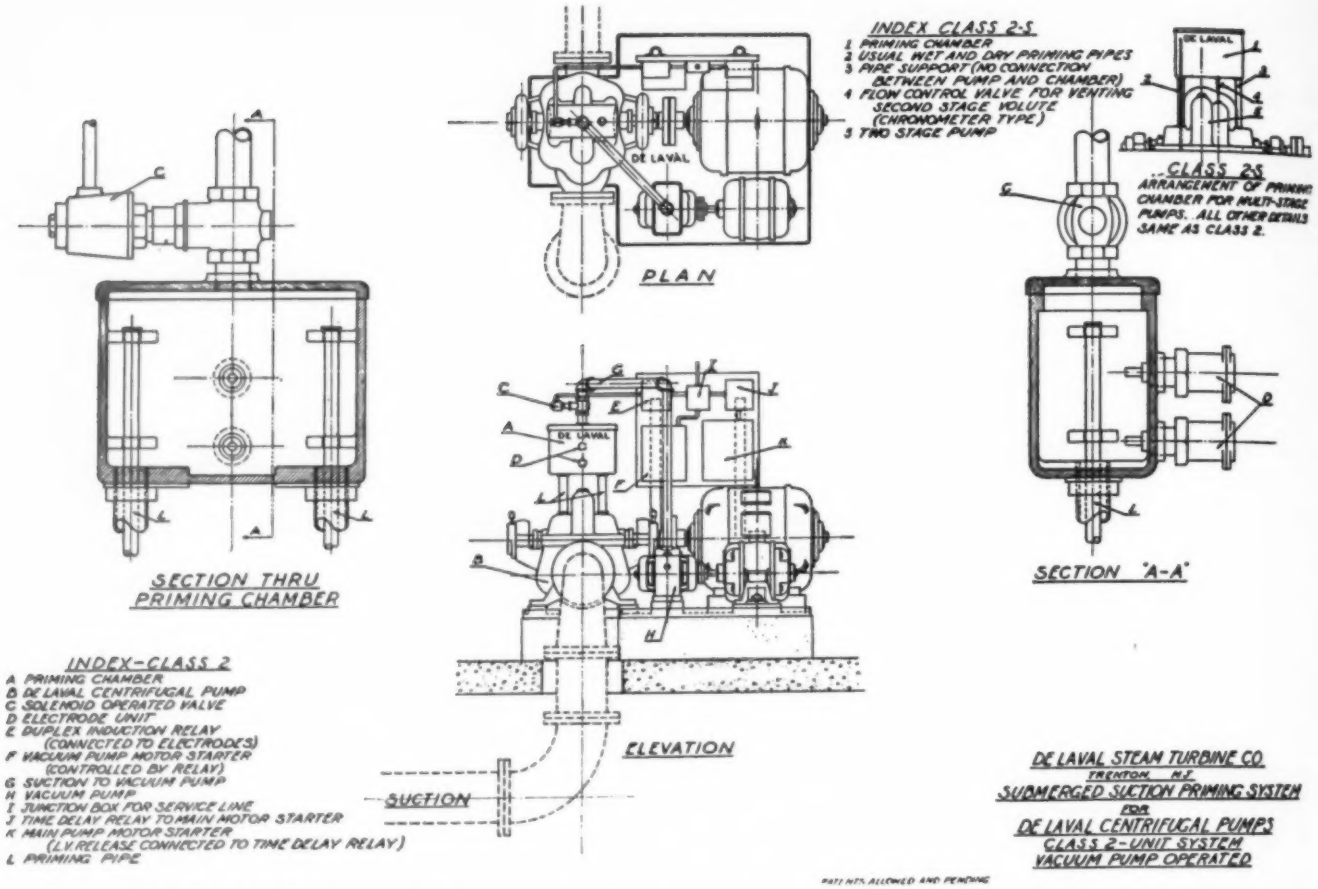


Fig. 5. Hydraulic Coupling Between Two Pumps in Series Regulates Output of Both


INDEX CLASS 2-S
1 PRIMING CHAMBER
2 USUAL WET AND DRY PRIMING PIPES
3 PIPE SUPPORT (NO CONNECTION BETWEEN PUMP AND CHAMBER)
4 FLOW CONTROL VALVE FOR VENTING SECOND STAGE VOLUTE (CHRONOMETER TYPE)
5 TWO STAGE PUMP
PLAN
CLASS 2S
ARRANGEMENT OF PRIMING CHAMBER FOR MULTI-STAGE PUMPS. ALL OTHER DETAILS SAME AS CLASS 2.
SECTION THRU PRIMING CHAMBER
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A PRIMING CHAMBER
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D ELECTRODE UNIT
E DUPLEX INDUCTION RELAY (CONNECTED TO ELECTRODES)
F VACUUM PUMP MOTOR STARTER (CONTROLLED BY RELAY)
G SUCTION TO VACUUM PUMP
H VACUUM PUMP
I JUNCTION BOX FOR SERVICE LINE
J TIME DELAY RELAY TO MAIN MOTOR STARTER
K MAIN PUMP MOTOR STARTER (LV RELEASE CONNECTED TO TIME DELAY RELAY)
L PRIMING PIPE
DE LAVAL STEAM TURBINE CO.
TRENTON, N.J.
SUBMERGED SUCTION PRIMING SYSTEM FOR DE LAVAL CENTRIFUGAL PUMPS
CLASS 2-UNIT SYSTEM
VACUUM PUMP OPERATED
PATENTS ALLOWED AND PENDING

Fig. 6. Details of Unit System of Submerged Suction Priming System for Centrifugal Pumps, Vacuum Operated

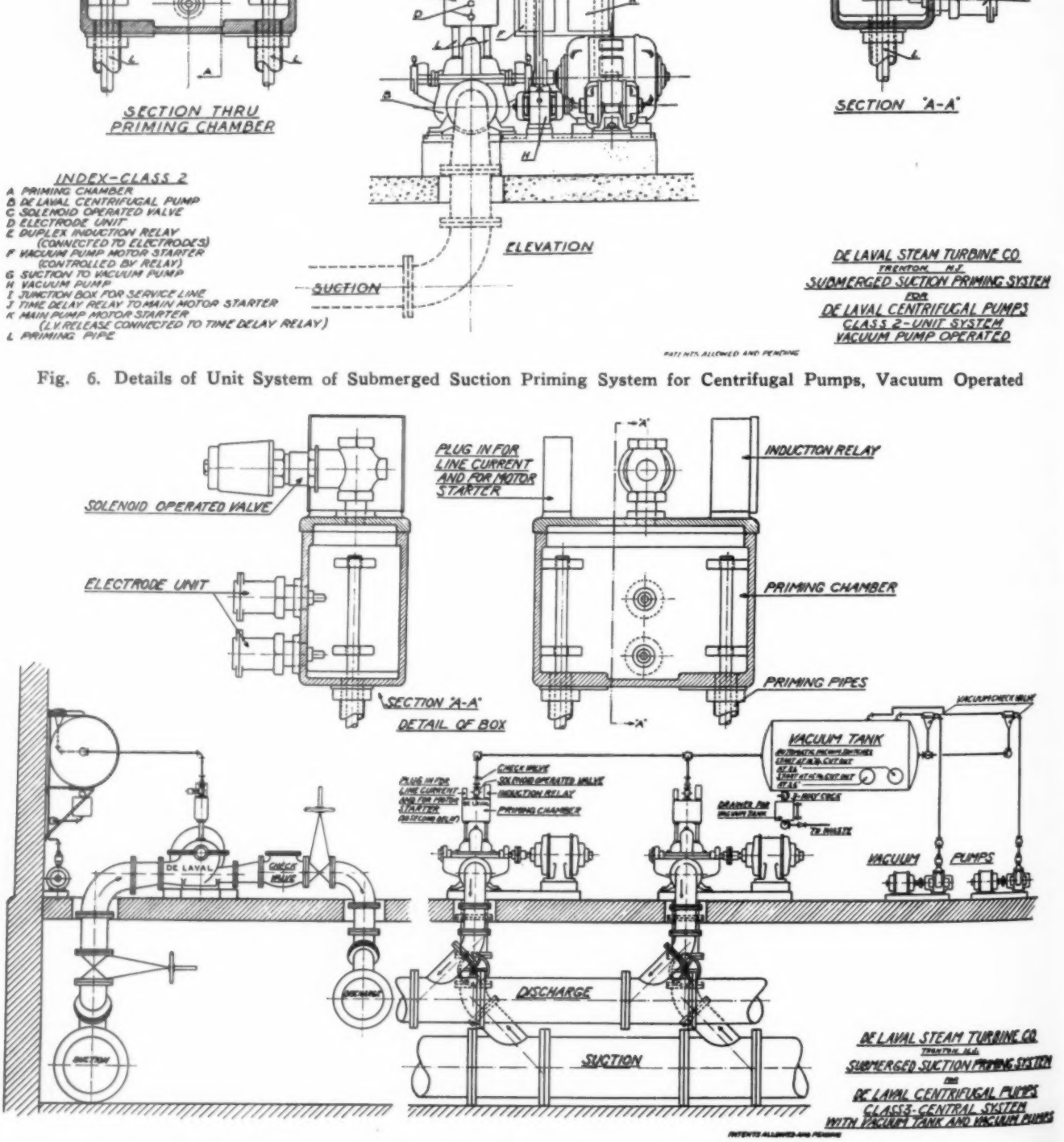

Fig. 7. A Central Submerged Priming System for Two or More Pumps

Notable progress has been made in the maintenance of high efficiencies as now obtained with centrifugal pumps. A high initial efficiency is not of much value unless the water works operator can be assured that this efficiency will be maintained for a reasonable length of time, and much progress has been made in this respect. Practically the only point where wear affects the efficiency of a centrifugal pump is at the joint between discharge and suction chambers. The casing and impeller are, or should be, protected from wear at this point by removable rings. With the present tendency to use single stage pumps for heads above 200 ft., the leakage through wearing rings, particularly in small and moderate size pumps, becomes a considerable item, and naturally manufacturers make the clearances at this joint as small as possible in order to be able to guarantee high efficiencies.

However, due to the action of the high velocity water passing between the rings, of shaft deflection, and of possible whipping of the shaft, wear of the rings occurs, with consequent reduction in efficiency. An ideal pump should not depend on small ring clearances for its efficiency and it is here that the labyrinth wearing ring stands out as one of the most significant developments in centrifugal pump design. Although this type of ring was developed and used more than thirty years ago, it has been only within recent years that users of centrifugal pumps have fully appreciated its advantages.

Tests indicate that for the same clearance the double labyrinth ring as shown in Fig. 8E gives about one-third of the leakage of the plain ring, Fig. 8C.

This is of considerable importance in centrifugal pump design because not only does it result in higher initial efficiencies, but also in better sustained efficiencies. In view of the one-third lower velocity of the water through the labyrinth ring, there naturally will be less wear of this type of ring than of the flat ring, and this stands out particularly in the case of pumps handling gritty water.

Practically the only reason why the efficiency of a centrifugal pump drops off by use is wear in the rings, and therefore anything that can be done to reduce the amount of wear is of considerable advantage.

Leakage losses are something that cannot be seen, and unless the pump is tested at regular intervals it may be operated for a considerable time with worn rings and at very much reduced efficiency.

As a rule, labyrinth rings are not used so much for the purpose of obtaining a higher initial efficiency as for the purpose of permitting larger clearances without a sacrifice in efficiency. This is also important, as it is not then necessary to machine the revolving ring after it is put on the impeller. The latter practice is objectionable because it is not always convenient for a customer in case he orders a replacement ring to take the pump rotor to a machine shop to have a finishing cut taken on the impeller ring.

Another advantage that stands out in connection with

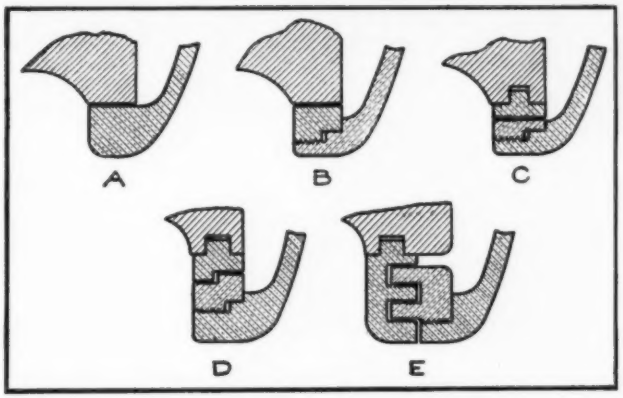

Fig. 8. Evolution of De Laval Labyrinth Wearing Rings. A—plain flat joint without protecting rings; B—wearing ring on impeller only; C—rings on both casing and impeller; D—offset wearing rings; E—perfected De Laval labyrinth rings

large clearance labyrinth rings is that for a certain fixed amount of wear the leakage is increased by a smaller percentage than for the same amount of wear in the close clearance plain rings.

Assuming that a plain ring with .012 in. clearance on the diameter has a leakage of 5 per cent and that the same amount of leakage is obtained with a labyrinth ring with .030 in. clearance on the diameter, and that both rings have worn .012 in. on the diameter, we have a loss in efficiency in the case of the flat ring of 5 per cent and with the labyrinth ring a loss of only 2 per cent, assuming no change in coefficient of discharge.

The above advantages of the labyrinth wearing rings are borne out by actual experience. Pumps so equipped have been carefully tested when installed and again after six or seven years' operation in several water works and the loss in efficiency varied from zero to a maximum of 1 per cent for these tests.

Although it is more or less futile to predict what the future has in store for us in the way of progress or improvements, it is nevertheless fairly safe to state that great improvement in maximum efficiency of centrifugal pumps cannot be expected. Efficiencies of around 90 per cent are now being obtained on pumps of moderate size, and when considering the amount and nature of losses in a centrifugal pump, such as leakage and bearing, packing and impeller friction, and the loss in conversion into pressure of the large kinetic energy of the water leaving the impeller, it is easy to realize that not much improvement can be looked for.

This statement does not apply, however, to the smaller sizes of pumps where improvements are still possible mainly due to improved surface finish.

The above should cover in a general way the march of progress of the water works pump. Needless to say, the pump manufacturers are forever striving to improve their product further and to give the water works engineer the very best that human ingenuity can provide.

Switched Captions

A Correction

On pages 8 and 9 of the review of "Developments of the Year in Water Supply" by Wendell R. La Due, featured in our January number, appeared two pictures of elevated water tanks. Unfortunately the captions under these two pictures became switched. The picture of the tank from the air, showing the aluminum roof and other details of aluminum alloy, is the new 500,000 gal. tank of Macon, Ga., representing "Something New in Tank Design." The tank, on page 9, is the new 500,000 gal. tank of toroidal bottom design serving the Washington Suburban Sanitary District. We regret very much this switching of captions and again call attention to the practical utilization of corrosion resistant light weight aluminum and aluminum alloys as a new departure in elevated tank design.

TAPPING A 42-INCH CONCRETE MAIN UNDER PRESSURE

By M. J. SHELTON
Construction Engineer
LA MESA, LEMON GROVE AND
SPRING VALLEY IRRIGATION DIST.
LA MESA, CALIF.

OCCASIONALLY, it is necessary for an irrigation district of a city water department to cut into large mains for the installation of services or distribution lines.

An example of this situation was just such a cut-in made by the La Mesa, Lemon Grove, and Spring Valley Irrigation District. This particular cut-in was an 8-in. tap to connect a new service main to the system, and the cut-in was made on the 42-in. centrifugally spun reinforced concrete pipe line.

After the excavation had been completed, a hole was cut into the side of the 42-in. concrete main using hand tools. The size of the hole was just large enough to take an 8-in. standard steel pipe nipple; and the depth of the hole was just sufficient to obtain a reasonable penetration of the nipple into the main (approximately 1½ inches.)

Particular care was taken that concrete was not removed from around the reinforcing steel and the depth of penetration was not sufficient to cause a leak to develop. For this reason hand tools were used instead of an air driven chipping hammer. Next, the surface of the concrete pipe was roughened for a width of approximately 20-inches and for half the circumference of the pipe (Fig. 1.)

Fig. 1. Hand Cut Hole and Roughened Surface Preliminary to Placement of Saddle

Fig. 2. Saddle in Place—Bolted by Four ½-in. Bolts

At such times, it usually happens that the main cannot be cut out of service while the tapping operation takes place.

Fig. 3. Top View of Saddle Tapping Machine at Lower Left

Fig. 4. Tapping Machine Installed—Concrete block (in forms) to Anchor Saddle

A one-quarter inch steel plate saddle was constructed with the 8-in. standard steel pipe nipple welded into the center of the plate, the nipple extending approximately one inch inside of the saddle. This saddle was then placed on the concrete main with a plaster coat made of quick setting neat cement being placed between the saddle and the surface of the pipe. The saddle was then bolted to the main by the use of four one-half inch bolts extending around the other half of the pipe (Fig. 2.)

The outer end of the nipple had been threaded prior to its being placed in the saddle and a standard steel flange was installed. To this was bolted a regular 8-in. tapping valve, as shown in the lower left hand corner of Fig. 3 and again in Fig. 4. A concrete anchor block, using quick setting cement, was then placed completely around the main, covering the saddle, bolts and face of the 8-in. valve. This block, (before the forms were removed) is shown in Fig. 4.

A standard Mueller tapping machine was then bolted to the outer face of the gate valve (Fig. 4) and tapping operations were carried out until the core was cut out of the main. The core is shown in Fig. 5.

Inasmuch as the La Mesa, Lemon Grove and Spring Valley Irrigation District has so few occasions to perform such work, the tapping machine used was hand operated rather than by power.

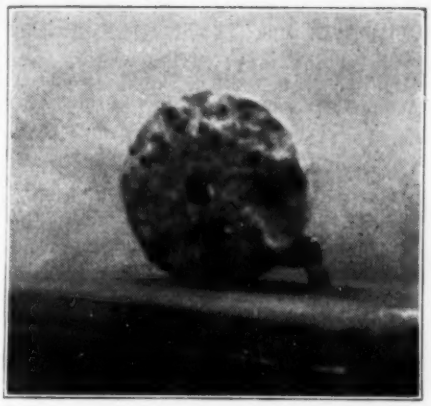

Fig. 5. Core Removed by Tapping Machine

Some difficulty was encountered in the use of the tapping machine, particularly in cutting through the ⅜-in. reinforcing steel. This difficulty was overcome by brazing borium tips on the end of each tooth of the cutter, after which the cutting was accomplished rapidly. The cutting in of this 8-in. main was completely successful.

Water & Sewage Works Fellowships Available

N. J. Agricultural Experiment Station Offers Opportunity for Students

Dr. Willem Rudolfs, Chief, Dept. of Sanitation of the New Jersey Agricultural Experiment Station of New Brunswick, N. J., has announced the availability of several fellowships beginning February 1, 1947.

The stipend for these fellowships amounts to free tuition and $1200 a year on a 12 month basis. There are no teaching or other duties except research work. The men accepted for these fellowships are allowed to have 11 credit hours per semester for an advanced degree.

Dr. Rudolfs states that it is preferred to have students who have some knowledge of chemistry and biology.

Applicants for the fellowships should present a transcript of college work together with a personal letter of recommendation to be sent to Dr. Rudolfs.

AWWA's President Responds in Spanish

Florida-Cuban Sections Get a Surprise When Señor LaDue Unsuspectedly Turns on His Best Spanish

Señor Presidente Machado, Honorable Alcalde Supervielle, distinguidos visitantes, hermosas señoras y senoritas, caballeros, y amigos,—como vuestro presidente, tengo el honor de transmitir a vosotros el saludo y plácemes de la sociedad paternal—la Asociación Americana de Acueductos. En la presente ocasión somos en realidad americanos, porque esta junta de las Secciones Cubana y de la Florida simboliza la union de dos grandes pueblos en notable y significativa demostración de buena voluntad, de común interés y colaboración.

No ignoro la presencia de otros miembros y amigos de las grandes repúblicas de las Islas de Carribeas y sud y centroamericánas.

Nuestra causa es de recíproco interés. Nos coaligámos en un esfuerzo comun para lograr y conservar para los pueblos de nuestros respectivos paises mejores normas de vida, poniendo a su alcance medios de sanidad y servicio de agua pura.

Nuestra profesión es meritoria y elevàda, de la cual nos sentimos justamente orgullosos. Nuestros grandes paises, mediante nuestros esfuerzos mutuos, marchan a la cabeza del mundo en lo que respecta a esta laudable obra.

Gracias muchas, Honorable Alcalde, por vuestras generosas frases de bienvenida. Y muchas gracias, amigos.—Wendell R. LaDue.

(American Translation)

Mister Chairman Machado, Honorable Mayor Supervielle, distinguished guests, ladies and gentlemen, friends,—as your president, I am honored to bring to you the greetings and felicitations of the parent society—the American Water Works Association. In this instance we are truly American, for this meeting jointly of the Cuban and Florida Sections brings together two great peoples in outstanding and significant evidence of good-will, mutual interest and cooperation.

I am not unmindful of the presence here of our members and friends from the great republics of the islands of the Carribean and of South and Central America.

Ours is a common cause. We are united in striving to provide and maintain for the peoples of our respective countries better living through the medium of sanitation and of a pure, safe water supply.

Ours is a worthy and exalted profession of which we are justly proud. Our great countries, through our mutual efforts, lead the world in this most worthy enterprise.

Many thanks to you, Honorable Mayor, for your gracious words of welcome. Many thanks, friends.—Wendell R. LaDue.

Three old-timers retired: W. D. Collins at the U. S. G. S.; "Joe" Bradley at Valparaiso, Ind.; and "Bill" (Honest Farmer) Clark at Avon, N. Y.—Harold Hay went to Europe; Frank Elder left the Army to become Engineering Associate at the Am. Pub. Health Assn.—I ran a teaser in one column—it flopped.—Several of the "boys" in the W. & S. W. world were advanced: Doc Taylor to Asst. City Mgr. of Roanoke, Va.; Gordon Fair to Dean of the Harvard Graduate School; "Bill" Eastburn to New England Representative of Mathieson; "Bill" Allen was "moved up" at Pasadena, Calif.; as were A. J. Kerr at Rockwell Mfg., Ed Cleary at *Eng. News Rec.*, "Bob" Orth at Johns-Manville, Charlie Bourgin at Montclair, N. J., and "Vic" Weir at St. Louis County Water Co.—I won the Indiana Section Golden Mitten Contest.

Fred Stuart and Al Brumley continued their glorification of beauty via calendars, introduced electronic coagulation, and hired Cecil Haney as research engineer.—I gave three talks on public relations, two on industrial waste, one on how to present a technical paper, and conducted one quiz session.

No one took me up on my "Here and There Golf Cup Contest," but Rockwell held a contest on the advantages of metering, and "Bill" Hurlbut, M. M. Gibbons, Ted Kain and Sam Newkirk won prizes—I didn't enter the contest—that competition is too tough.

"Art" Bedell, John Kienle, J. K. Marquis, C. L. Kennicott, and Wm. R. Conard were well known names inscribed in the ledger of Death.

I reviewed several books, including a love story (The Heart Has Reasons), and wrote the story of Wibb Shaw's Busy Day at Indianapolis.—This column ran a good picture of Jack Van Atta, and a better one of Kay J. (better subject).—Best story in the column, during the year, was about "Len" Thompson, and two of my favorite correspondents, Sam Newkirk and Mike Glace appeared frequently in the column.

This magazine changed its name and I gradually got used to it, as did nearly every one else. Better name, at that! Many persons commented on the excellence of "Lou" Howson's article on construction costs and water rates.—When I saw the A. W. W. A. poster reading "Use Water Wisely," I didn't rewrite it to read, "Use Water, Wisely"—Pete, that is! Ouch!

I saw the club room idea tried in several places—it wasn't always successful.—Wonder what this review will have to say next year?

* * *

In my December column I announced to the waiting world the availability of the 9th Edition of Standard Methods (price $4 from the Am. Pub. Health Assn.)—plug.—In that same announcement I offered to obtain copies for anyone desiring same. Not only that, but I offered to have the copies autographed by the editor if requested.—Now this latter offer was strictly in the general spirit of this column—fun, that is, and I fully expected to receive some good natured ribbing, which I did—I didn't expect to receive any bona-fide requests for autographs—which I did.

So now the A. P. H. A. and yours truly are in a quandary—what to do? We've decided to set aside ten copies which the editor definitely will autograph if requests are received for them.—Any takers?—Incidentally, if you haven't ordered your copy yet, you'd better hurry before the first printing is all gone.

* * *

ONE COAT...THIS THICK
TWO COATS...THIS THICK
THREE COATS...THIS THICK
THICK ENOUGH TO PROTECT SEWAGE PLANT SURFACES AGAINST ANY CORROSIVE CONDITION
GENUINE BITUMASTIC CARRIES THIS SEAL
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Three coats of Bitumastic #50 will cover metal, masonry or concrete surfaces with 1/16" of carefully refined heavy coal tar pitch, a protective shield with sufficient body to ward off corrosion from even the most active acids and fumes.

Each coat is equal to 8 coats of ordinary paint, but in spite of this thickness, Bitumastic #50 works easily and is applied readily with a brush. The refined coal tar pitch that forms its base is the most universally accepted protection against corrosive action.

There's a data sheet devoted exclusively to the subject of corrosion—proofing for Sewage Disposal Plants—ask for form 342. Address Wailes Dove-Hermiston, Westfield, N. J.

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OPERATING IMPROVEMENTS . . . WITH CHICAGO EQUIPMENT

Exclusive developments of the Chicago Pump Company allow the old-type relatively inefficient plant to be quickly and easily converted to new economy and improved operation; as well as assuring the last word in equipment for new plants.

Chicago air diffusion systems can replace any of the obsolescent diffusers . . . comminutors can and should replace screens, giving sure-fire, trouble-free screening and cutting of all coarse materials . . . Flush-Kleen pumps guarantee clog-*proof* handling of raw sewage, as all solids are automatically screened from the impellors . . . to pump primary sludge without clogging, another Chicago first is the Scru-Peller, which provides continuous multiple shearing as it operates.

WIDE BAND AIR DIFFUSION

Chicago Wide Band Air Diffusion System with Swing Diffusers produces maximum fineness of air bubbles with greatest contact volume of diffusion without coalescence. They can be adapted to virtually any size and shape of tank to accomplish the desired maximum efficiency results. Installation is removable for simple inspection and cleaning.

COMMINUTORS

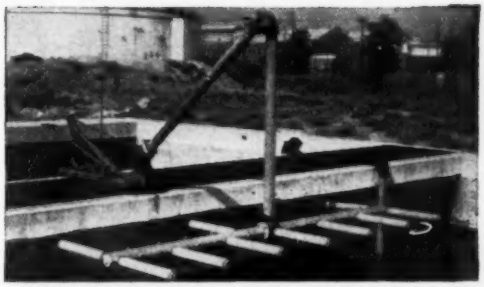
Eliminate nuisance and screening labor. Cut and chop all coarse sewage solids. No screenings to handle, no burial, no incineration. Promotes rapid settling of solids in primary settling tanks. Comminutors protect mechanical equipment, eliminate pipe clogging and possibility of operators' infection in handling screenings. Bulletin 185B.

FLUSH-KLEEN SEWAGE PUMPS

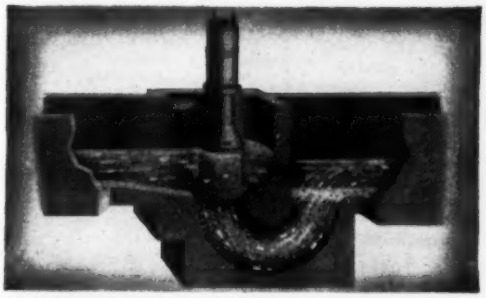
Pump clogging is never experienced with "Flush-Kleens," the most reliable sewage pumps made. Solids are automatically screened from impellers and flushed to sewer. The pumps require no maintenance, except periodic lubrication. Bulletin 122.

SCRU-PELLER SLUDGE PUMPS

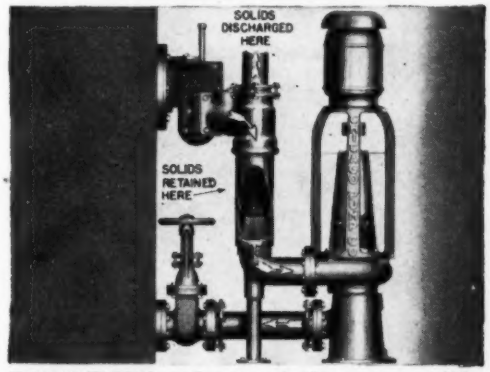
Primary sludge pumping as easy as clear water pumping with the "Scru-Pellers," centrifugal pumps with screw feeds. Nine cutting edges provide continuous multiple shearing actions all the way through the pumps. Bulletin 190.



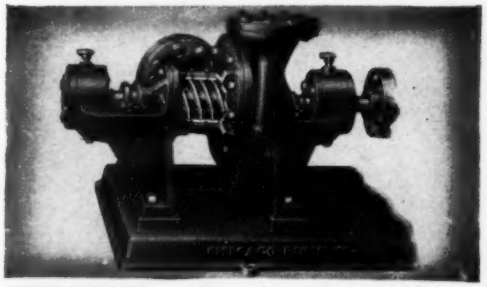
SWING DIFFUSERS . . . Diffuser Tubes may be raised to walk without interrupting operation.



COMMINUTOR . . . eliminate screening nuisance and pump clogging.



FLUSH-KLEEN . . . Rags and other coarse solids do not pass through impeller.



SCRU-PELLER . . . Centrifugal Pump with cutting screw feed.

CHICAGO PUMP COMPANY

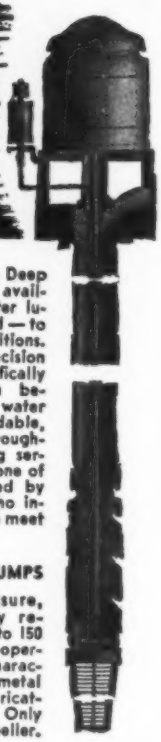
SEWAGE EQUIPMENT DIVISION

2349 WOLFRAM STREET — **CHICAGO 18, ILLINOIS**

Flush Kleen, Scru-Peller, Plunger, Horizontal and Vertical Non-Clogs, Water Seal Pumping Units, Samplers.

Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Comminutors.

Where *Streamlining* Pays Dividends
DEEP WELL TURBINE PUMPS
"by Aurora"



Sizes 4" to 24"

These outstanding Aurora Deep Well Turbine Pumps are available in both oil and water lubricated units as desired — to meet all operating conditions. Their sturdiness and precision manufacture plus scientifically streamlined coordination between impellers and water channels insures dependable, low cost water supply throughout an exceptionally long service life. Their record is one of high merit — as evidenced by the many Aurora users who install additional Auroras to meet expansion requirements.

AURORA CENTRIFUGALS
for Every Pumping Job
HORIZONTAL SPLIT CASE
Single & Two Stage
SIDE SUCTION
VERTICAL
NON CLOG
SUMP
MIXED FLOW
SPECIAL DESIGN
Write for
CONDENSED CATALOG "M"
or
Consult SWEETS

APCO TURBINE-TYPE PUMPS

For high-pressure, small capacity requirements (up to 150 g.p.m.). Wide operating range characteristics. No metal to metal contact. Handles non-lubricating liquids without wear. Only one moving part—the Impeller.

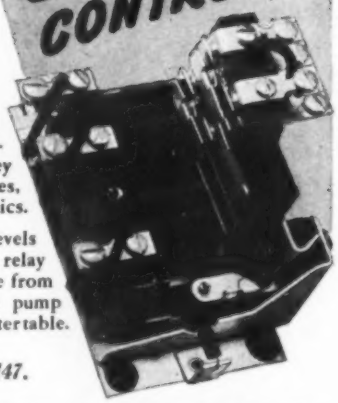
DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS

AURORA PUMP COMPANY

68 Loucks Street, AURORA, ILLINOIS

B/W FLOATLESS *All Electric* LIQUID LEVEL CONTROLS



● B/W Controls were created in 1933, for positive, dependable liquid level control.

B/W Controls have no floats —no vacuum tubes—no moving parts in the liquid. They are unaffected by pressures, temperatures, acids or caustics.

They control variations in levels from ¼" upward, and the relay may be located any distance from the electrodes. Invaluable pump protection against falling water table.

Write for Catalog 147.

B/W CONTROLLER CORPORATION

2206 E. Maple Road, Birmingham, Mich.

FIRST IN THE FLOATLESS CONTROL FIELD

MEETINGS SCHEDULED

Feb. 23-25—ST. LOUIS, MO. (Statler Hotel)
American Concrete Pipe Association. (National Convention.) Director, Howard F. Peckworth, 228 N. LaSalle St., Chicago, Ill.

Feb. 27—BOSTON, MASS. (Hotel Statler)
New England Water Works Association. Sec'y, Jos E. Knox, 609 Statler Bldg., Boston 16, Mass.

Mar. 4—ROANOKE, VA. (Hotel Roanoke)
Virginia Industrial Waste & Sewage Works Association. (Organization Meeting.) Richard Messer, Dept. of Health, Richmond, Va.

Mar. 13-14—WICHITA, KAN. (Hotel Broadview)
Kansas Section A.W.W.A. Sec'y, Paul D. Haney, Room 2, Marvin Hall, Univ. of Kansas, Lawrence, Kan.

Mar. 13-15—ST. PAUL, MINN. (Lowry Hotel)
Minnesota Section A.W.W.A. Sec'y-Treas., R. M. Finch, 416 Flour Exchange Bldg., Minneapolis, Minn.

Mar. 19-21—TRENTON, N. J. (Stacy-Trent Hotel)
New Jersey Sewage Works Association. Sec'y-Treas., M. S. Kachorsky, P. O. Box 283, Manville, N. J.

Apr. 7-10—CHICAGO, ILL. (Palmer House)
The National Ass'n of Corrosion Engineers. Exec.-Sec'y, A. B. Campbell, 711 Main St., Houston, Texas.

Apr. 10-11—BUFFALO, N. Y. (Statler Hotel)
New York Section A.W.W.A. (Spring Meeting.) Sec'y-Treas., R. K. Blanchard, 50 West 50th St., New York.

Apr. 11-12—LINCOLN, NEB. (Hotel not selected)
Nebraska Section A.W.W.A. (Organization Meeting.)

Apr. 14-16—MONTREAL, CAN. (Mount Royal Hotel)
Canadian Section A.W.W.A. Sec'y-Treas., A. E. Berry, Parliament Bldgs., Toronto, Ont.

Apr. 17-18—CHICAGO, ILL. (Congress Hotel)
Illinois Section A.W.W.A. Sec'y-Treas., H. A. Tolburg, 2020 S. Fifth St., Springfield, Ill.

Apr. 25-26—HAVRE, MONTANA (Havre Hotel)
Montana Section A.W.W.A. Sec'y, C. W. Brinck, State Board of Health, Helena, Mont.

May 7-9—INDIANAPOLIS, IND. (Antlers Hotel)
Indiana Section A.W.W.A. Sec'y, Charles H. Bechert, 200 Underwriters Bldg., Indianapolis 4, Ind.

May 15-17—VICTORIA, B. C.
Pacific Northwest Section A.W.W.A. Sec'y, Prof. Fred Merryfield, Oregon State College, Corvallis, Ore.

May 21-22—LAFAYETTE, IND. (Memorial Union Bldg., Purdue Univ.)
Third Industrial Waste Utilization Conference. Gen. Chairman, Prof. Don E. Bloodgood, Purdue University, Lafayette, Ind.

May 26-27—ALBANY, N. Y. (Hotel Ten Eyck)
New England Sewage Works Assn. (Joint Meeting with) **New York State Sewage Works Assn.** Sec'y, W. E. Merrill, 511A State House, Boston, Mass.

June 19—(Place not decided)
N. J. Section A.W.W.A. Outing. Sec'y, C. B. Tygert, Box 178, Newark, N. J.

July 21-25—SAN FRANCISCO, CALIF. (Auditorium)
American Water Works Association 1947 Conference. Executive-Secretary, Harry E. Jordan, 500 Fifth Ave., New York 18, N. Y.

July 22-24—SAN FRANCISCO, CALIF. (Auditorium)
Federation of Sewage Works Associations. (20th Annual Meeting.) Executive-Secretary, W. H. Wisely, 325 Illinois Bldg., Champaign, Ill.
(Meetings and Exhibits in the Auditorium.) Application blanks for hotel accommodations may be obtained from the respective Association Headquarters.

Take a Tip From the Products You Use Every Day . . .

They're made with the aid of BECKMAN pH CONTROL!

WHAT ABOUT YOUR PRODUCT?

FEW PEOPLE—even those in industry themselves—realize the many diversified ways Beckman pH Control is being used to cut costs, reduce waste, improve operating efficiencies and insure a more uniform quality in dozens of products of daily use. For example . . .

The gasoline you use was probably refined with the aid of Beckman pH Control. Major refineries use Beckman pH Equipment to control the acidity of their processing operations, thus, not only improving the product, but also minimizing corrosion of costly plant equipment.

The paper you read in your magazines and books, as well as that which you use in your own catalogs and literature, are both made under the close control of Beckman pH Equipment. The paper mills manufacturing the finer qualities of paper use Beckman pH Control to regulate acidity in their processing operations and to insure more uniform printing qualities in the finished paper.

The sugar you eat was undoubtedly refined under the close control of a Beckman pH instrument—for accurate pH control has become an indispensable part of every well-managed sugar refinery.

The suit you wear, as well as your sox, shirt and other textiles you and your family use were probably produced with the aid of Beckman pH Control. It insures color-fastness, more uniform quality, greater strength in the finished fabric.

WHY NOT YOUR PRODUCT? Example after example can be cited where the job is being done better *for less* by means of Beckman pH Control. Chances are in *your* plant there are many important savings to be made through the installation of Beckman pH Control. Wherever there's water, there's pH—whether in chemical solutions, fluid pulps, moist pastes, sludges, industrial wastes or vat and tank processes. And wherever water or water solutions are used, chances are product quality can be improved, waste reduced and operating efficiency increased through the use of Beckman pH Control.

Why not find out about *your* product? Our trained engineering staff will be glad to work with you in recommending what can be done—possibly is already *being* done—in your particular field of industrial operation. *Beckman Instruments, National Technical Laboratories, South Pasadena 11, California.*

FACTS YOU SHOULD KNOW ABOUT BECKMAN pH EQUIPMENT

...that Beckman pioneered modern glass electrode pH equipment, transforming the cumbersome laboratory apparatus formerly used into a compact, practical portable instrument that paved the way for today's simplified pH measurement and control.

...that the first completely automatic glass electrode pH indicator, recorder and controller was pioneered by Beckman. Operating entirely without batteries, this instrument made automatic process control accurate, convenient, practical—and is today widely used in all parts of the world.

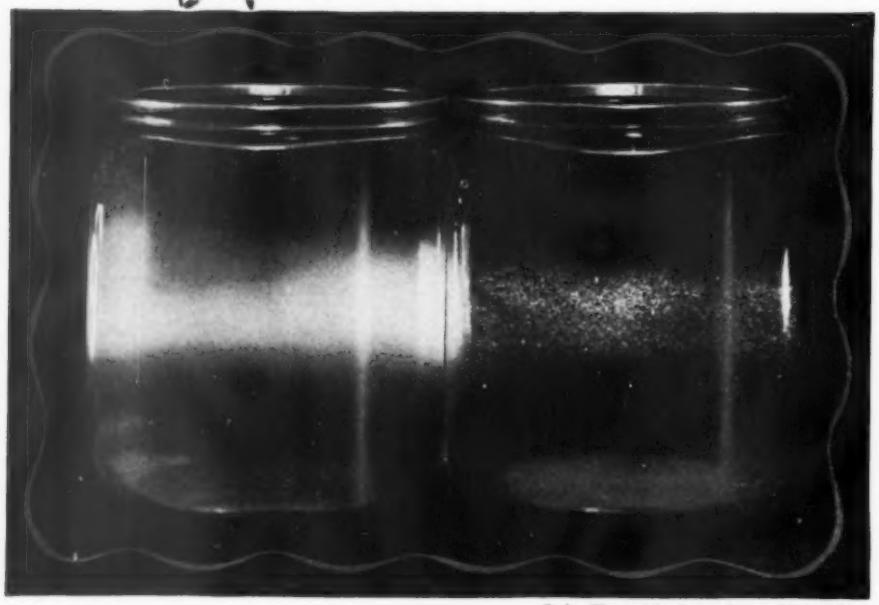
...that the only High Temperature Glass Electrode system available today is a Beckman achievement. This electrode system for the first time, enables continuous pH measurements to be made at temperatures up to 212°F (100°C) and is of tremendous value wherever hot process fluid must be controlled.

...that the only High pH Glass Electrode system is also a Beckman development. This is the only glass electrode that can be used to measure high pH values *even in the presence of sodium ions*... and extends the usefulness and accuracy of glass electrode equipment to many industries where alkaline solutions in combination with sodium ions have heretofore presented difficulties.

The above are only a few of many developments that make Beckman pH Equipment the only pH instruments embodying every modern advancement in the field of pH measurement and control.

FREE..."What Every Executive Should Know About pH"—a helpful, non-technical booklet containing much valuable information on the subject of pH—what it is—how it is used. Send for your copy today.

BECKMAN INSTRUMENTS CONTROL MODERN INDUSTRIES



Left: Floc with alum alone. Right: Floc with alum plus activated silica sol.

PIN-POINT? OR SNOW-STORM FLOC—the larger and heavier floc which enmeshes the suspended solids better, and settles more rapidly!

Get this increased floc size and improved clarity by using the activated silica sol coagulant aid made with sodium silicate. Besides clearer water, you can count also on longer filter runs and increased capacity.

Study now the benefits from the use of N-Sol Processes (activated silica sol) in your water supplies. For the correct results, send for fresh samples of N Brand with jar test directions.

Four ways of converting N Brand Sodium Silicate into useful coagulant silica sols to fit your conditions:

N-Sol-A*—N Brand reacted with ammonium sulfate. Used where chloramine sterilization is desired.

N-Sol-B—N Brand reacted with alum. Used with any sterilization procedure. (U. S. Pat. 2,310,009).

Baylis Sol—N Brand Silicate reacted with sulphuric acid. Used with any sterilization procedure. (U. S. Pat. 2,217,466).

N-Sol-D—N Brand reacted with sodium bicarbonate. Used with any sterilization procedure.

* Patent Applied For.

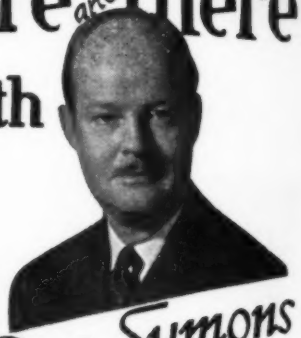
N-SOL PROCESSES FOR WATER COAGULATION

Developed and Patented by

Philadelphia Quartz Company

Available under license without charge • Philadelphia 6

Here and There with Doc Symons



This column had intended to do its own version of an annual review last month, but the printer's slow-down strike in December so delayed the Dec. and Jan. issues that I didn't get around to it until now.

Well—What did happen last year? What, that is, that Wendell La Due and "Fritz" Friel haven't reported on.—Several stalwart warriors returned to peaceful pursuits: Rolf Eliassen to N. Y. U.; "Tony" Anable to Dorr Co.; "Joe" Gilbert and "Rod" Coltart to Link-Belt; "Bill" Hardenbergh to *Public Works*; "So" Dappert, Charlie "Pops" Agar, and Stan Barker to the N. Y. State Dept. of Health, and hundreds of others.—I covered 18 conventions.

W & T honored Fred Merckle, "Jim" Kinney and Harold Davis for 25 years of service; "Ben" Gotaas was decorated three times, and several persons changed jobs: Ed Thwaites went to Preload; "Chuck" Velzy joined Buck, Seifert and Jost, and "Rol" Simpson (another Buffalo associate of mine) organized an industrial waste department for Gilbert Associates in Reading, Pa.; Frank Roe became eastern manager for Chicago Pump; L. L. Hedgepeth was picked to head the new Virginia Water Control Board; Lee Chamberlain went back to California and started a new company; Dan Atwell (please note spelling) became Dresser's New England Representative; A. A. Kalinske left Iowa to become Infilco's hydraulic engineer; "Doc" Renn headed the new Johns Hopkins Sanitary Engineering Laboratory; "Glad" Swope headed the laboratory of the Allegheny County Sanitary Authority; and Don Walker started a new company to produce sanitary engineering equipment.—After the 4-states meeting, Grace (Mrs. Fred) Stuart started calling me "Sonny," and I didn't write that article on the 13-month calendar.

Aren't those grades a little TOO FLAT?

NO... because we're putting in TRANSITE* SEWER PIPE

Transite's exceptionally high-flow capacity (n=.010) often permits a choice of two important economies:

(1) Flatter Grades: This means shallower trenches and correspondingly lower excavation costs—an especially important economy when dealing with deep trenches.

(2) Smaller Diameter Pipe: An alternate economy which the designer may take advantage of when deep trenches present no problem.

Savings like these are possible because Transite Sewer has an exceptionally high-flow capacity (n=.010). Composed of an intimate mixture of asbestos and cement built up on a polished steel mandrel, Transite Sewer Pipe has a smooth interior surface that offers minimum resistance to the flow of sewage.

Other money-saving Transite advantages are:

Less Infiltration—because of sleeve-type joints that *stay* tight...and long 13-foot lengths that result in fewer joints. Thus, the load on the treatment plant is reduced—treatment costs are lowered.

More Economical Installation—because Transite's light weight and long lengths make it easier to lay this pipe to line and grade.

Lower Maintenance Costs—because of Transite's asbestos-cement composition that combats corrosion inside, outside, and all the way through—*plus* tight joints that prevent costly root trouble.

For all the facts, write for the Transite Sewer Pipe brochure. Address Johns-Manville, Box 290, New York 16, New York.

JOHNS-MANVILLE JM PRODUCTS

*TRANSITE is a registered Johns-Manville Trade Mark

Johns-Manville TRANSITE SEWER PIPE

WATER VS. ELECTRIC RATES!

Here it is! A reproduction of a full page ad., the likes of which have been appearing in recent months in newspapers throughout the country. The general public, however, is not usually aware that there is more of a reason than altruism behind such "see what we are doing" rate reduction announcements.

This is the same ad. which "Bob" Simms, Supt. of Water and Sewage Works for Spartanburg, S. C., refers to in his article, "Power and Water Rates as Affected by Public Demand," that appears elsewhere in this same issue.

Read "Bob" Simms' article, for it contains much that is food for thought, including the value of keeping out in front with an ample supply of pure and palatable water as a measure for advancing good public relations through the development of a water rate structure which encourages the greater use and enjoyment of the community's water supply, while also bringing in a net income return which retires debt at a rate exceeding amortization schedules set up at the time of investing in plant extensions and distribution improvements.

DOWN AGAIN!

Electric Rate Cut

saves our customers

$5,430,800 a year

For the second time within ten months, and in the face of higher prices for most other things, Consolidated Edison announces another major reduction in its electric rates.

The cost of electricity in this area has come down steadily—in line with this company's aim to give New Yorkers the finest utility service at the lowest possible cost. Today the price of electricity is at the lowest point in the city's history.

This reduction, added to the previous rate cut of $6,300,000 announced last December, comes just at the time when new electric appliances are appearing in Cooperating Dealers' stores—to help New Yorkers enjoy more comforts and conveniences, electrically, in their homes, offices, stores, and industries.

EFFECTIVE AUGUST 15, 1946

CONSOLIDATED EDISON

It was before the Southeastern Section of AWWA, during a discussion concerning the need for higher water rates than are currently in force in the great majority of communities, if the public water utility is to remain self-supporting (or is ever to be made so), and at the same time is longer to be able to finance needed improvements and extensions to the system from water sale revenues, that the writer displayed the full page newspaper ad reproduced here.

This display was made as a prelude to the following question: "In the face of such publicized rate *reductions* by one utility, what explanations can the water works manager most effectively offer in his argument for *higher* rates for the product and service of a sister utility—the water utility?" It was the same question that the writer put to Mr. Howson when he was developing the prize-winning paper presented before the Am. Water Works Assn. on "Constructive Costs and Water Rates," and featured in the *AWWA Journal* and *W. & S. Wks.* for June 1946.

The writer then attempted to answer his own question by referring to the reasons cited in the Howson paper as to why the business and the trend in costs of producing and distributing water cannot be compared on any practical basis with those of other utilities under present day conditions. We think the explanations given by Mr. Howson are of sufficient import at this time to warrant their reproduction on this page.

WATER VS. OTHER UTILITIES

In a discussion of this subject with Linn Enslow, Chairman of the A. W. W. A. Program Committee, he raised a question which will probably be asked of many Association members, namely, why should it be necessary for water works to have increased rates when many electric companies have reduced their rates since the war? There are numerous reasons for this difference, among the more important being:

1. The per capita use of water increases very slowly, whereas the use of electricity is rapidly expanding. From 1925 to 1945, water works revenues per customer increased but 33 per cent, and part of this reflected rate increases. In the corresponding period the residential use of electricity per customer tripled. The average residential electric bill exceeds $30 per year. The average residential water bill is less than half as much.

2. Water utilities, like houses, are local and individual. Electric utilities are continually developing toward centralized generation and long-distance transmission. Electricity can be transmitted over a high-tension line for a long distance to a city of 10,000 population at a cost of $2,000 per mile of line. If the electric energy is generated in that 10,000 population town by coal it will take approximately 2 lb. of coal per kwhr. When generated in a large central station and transmitted to this city, the energy is available at less than 1 lb. of coal per kwhr. There is no analogous possibility in water works.

3. High-tension transmission has tied in great areas such as that from the Tennessee Valley to the Great Lakes and from the Appalachians to the Mississippi River. This makes available cheap hydroelectric power. Such pooling of facilities, which minimizes reserve equipment requirements, is practicable with water works.

4. Water works revenues have always been low compared to electric revenues. In nearly any city, water works revenues are but from 10 to 20 per cent of electric revenues. There is not the latitude in which to work with water revenues that there is with electric revenues. During the war period, some electric plants paid, as excess profits taxes, as much as $10.00 per capita served. No comparable payment by any water works is known to the author.

5. In comparison with natural gas, water is incompressible, an important factor in determining the distance over which it can be transmitted. Gas follows Boyle's Law, and, by compression to high pressures, can be transmitted economically over long distances. Natural gas from Texas is used practically to the Atlantic seaboard.

6. Water works, due to health and fire protection requirements, must maintain reserves not required of other utilities. Gas and electric service may be and are subject to infrequent but nevertheless recurring interruptions. A very large percentage of all the water works systems in the country have not had an interruption in service for decades. As a result, water works operate at a disadvantageous "load factor" as compared to gas and electric utilities.—*W. & S. Wks.*, June 1946.

L. H. Enslow

Water
as pure as a
Mountain Stream

DIAMOND
Liquid Chlorine
keeps your water pure, safe and palatable

The ever-increasing demand and necessity for pure, safe and palatable water, make DIAMOND Liquid Chlorine—with its dependable high quality and uniformity—a "must" for modern water treatment. Close control of all manufacturing processes guarantees year-round satisfaction.

Furnished in cylinders, multi-unit or single-unit tank cars to suit your needs. Write today for complete data.

DIAMOND ALKALI CO.

Pittsburgh 22, Pa., *and Everywhere*

CHLORINE

When I wrote my January column, the December issue wasn't printed yet (strike, you know) but I said that the annual index for 1946 would fail to get in the Dec. issue (strike. you know) and it would be mailed with the January issue, as section two of that issue. By now you have received the 1946 annual index and I hope you immediately clipped it into the Dec. 1946 issue.

* * *

"Wanna Buy a Water Works?" (And the town that goes with it?) If you want to buy a water works, just submit your sealed proposal to the War Assets Administration, Regional Office, 1710 So. Redwood Road, Salt Lake City, Utah.

Of course, you have to take some other stuff with it. In fact, you have to buy the whole city of Dragerton, Utah, and you get not only a complete water system but also a sewer system and sewage treatment plant, school, theater, candy store, church, post office, hospital, playground, 604 dwellings, laundry equipment, a guest house, one passenger sedan, and one electric clock, etc., etc., etc.

Built by the government in 1943 for $4,530,000, the town occupies 377 acres, 23 miles east of Price, Utah; it is hard by Desolation Canyon.

Oh, yes, if you buy the town you have 2,500 customers immediately. Most of them are coal miners still working the Geneva Coal Mine now being worked for the Geneva Steel Plant.

* * *

Clint Bogert must have laughed out loud when he found in a copy of *Newsweek* last Fall a sketch of the city of the atomic future (?) as depicted by the British Magazine, *The Sphere*. The whole city is designed for underground and while as Bogert points out, the water supply apparently is to come from above ground, there is at the bottom of the city a room labeled *"sewerage* disposal!" Ouch!

* * *

It had to happen some time—But I didn't expect to see it in a news release from the Pennsylvania State Sanitary Water Board. On Dec. 4 one of the many releases about the excellent work being done to clean up the Pennsylvania streams began as follows: *"Sceptic* tanks which are not properly constructed . . . can be a source of pollution of streams. . . ." I always thought skeptic was spelled with a **k**.

* * *

Youngest reader of W. & S. W. The following letter from Frank Roe speaks for itself. "Our son Peter, age three, has been a demon for more than a year about inspection and eventual disassembly of all water and sewage connections, fittings, etc., throughout the house. Also, practically his sole interest away from home has been catch basins, fire hydrants, etc. This interest reached a peak in September when he inspected the laying of the local sewer line.

"For diversion during 'toilet training,' Mrs. Roe has given him magazines from a discarded pile nearby. An issue of *Water & Sewage Works*, with an elevated tank on the cover, recently found its way to the top of said pile, and that took Peter's eye. Both eyes were soon wide with wonder and joy when he saw page after page of nothing but gadgets so close to his heart.

"Well, as you may guess, Peter now will have nothing to do with *Sat. Eve. Post, House and Garden,*

SPARLING MAIN-LINE METER

How Much?
Where? When?

What is that pump actually delivering? How much water does Tract 7463 take? At what rate is the reservoir filling — and emptying?

Savings in operating expenses are often many times the moderate cost of installing Sparling Main-Line Meters to furnish the facts!

For data, prices, etc., see Bulletin 309. Free upon request.

24-Hour
7-Day
60-Day
Recorders

Remote Control
INDICATOR-TOTALIZER-RECORDERS
Auto-Metered Controls

R. W. SPARLING
Manufacturer of WATER MEASURING EQUIPMENT

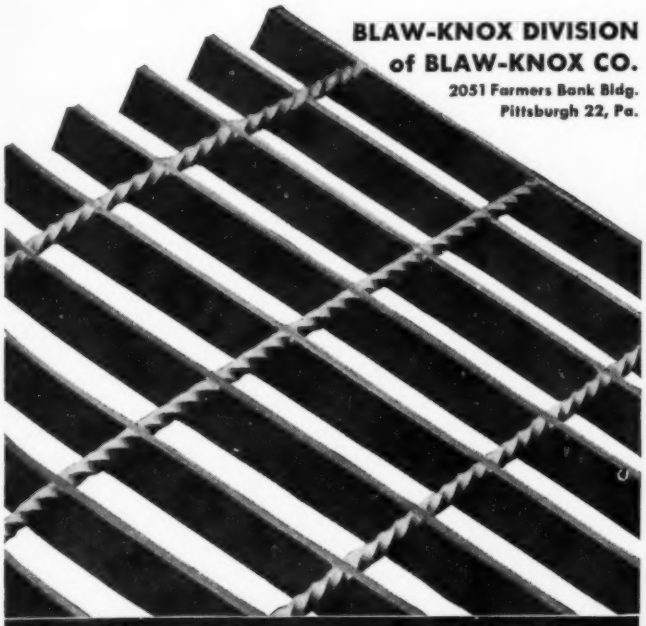
LOS ANGELES 54 Box 3277 Terminal Annex
CHICAGO 16. . . .3104 South Michigan Ave.
622 Broadway. . . . . CINCINNATI 2
101 Park Avenue. . . . . NEW YORK 17
BOSTON 8. . . . . 6 Beacon Street

5 GOOD REASONS

for buying Blaw-Knox Grating . . . COUNT 'EM!

1. STRONG electroforged construction for easy erection.
2. MAXIMUM OPEN AREA for light and air.
3. EASY TO MAINTAIN . . . paint reaches entire surface.
4. SELF-CLEANING, no sharp corners to clog.
5. SAFE footing at all times with twisted cross bar.

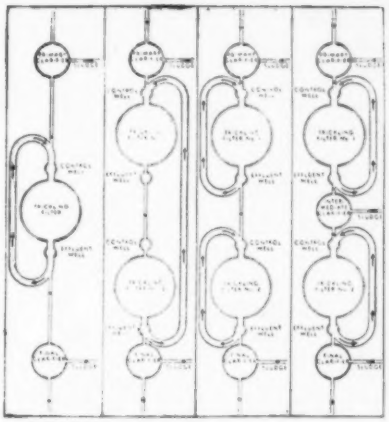
BLAW-KNOX DIVISION of BLAW-KNOX CO.
2051 Farmers Bank Bldg.
Pittsburgh 22, Pa.



BLAW-KNOX ELECTROFORGED STEEL GRATING

ACCELO-FILTER

Improves Sewage Treatment by DIRECT RECIRCULATION



IMPROVES EFFLUENT due to the return of active aerobic organisms to filter.

INCREASES CAPACITY of overloaded plants by higher dosing rates.

APPLICABLE TO EXISTING CONVENTIONAL PLANTS in many cases without alteration of structures.

SMALLER FILTERS are used in new Accelo-Filter plants than in conventional plants due to higher dosing rates.

SMALLER CLARIFIERS are used in Accelo-Filter plants than those required by other recirculation plants, due to the Accelo-Filter system of direct recirculation through the filter only.

ELIMINATES CLOGGING, SLOUGHING, PONDING, due to continuous flushing which prevents accumulations in filter.

PREVENTS ODORS by continuous flushing which removes excess biological gel before decomposition sets in.

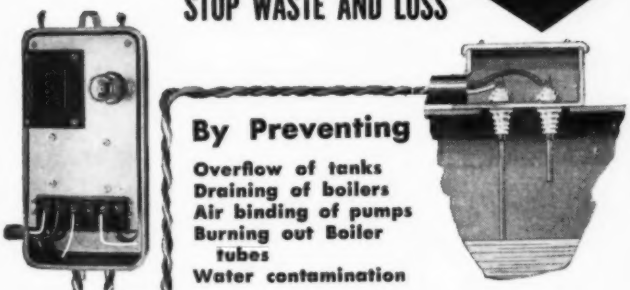
REDUCES FLY NUISANCE by keeping filter surface wet with continuous uniform dosing.

Ask for Bulletin 6200 INFILCO, Inc., 325 W. 25th Place, Chicago 16, Ill.

CONSULT INFILCO — FIRST IN WATER AND SEWAGE TREATMENT

these ELECTRONIC stainless steel FINGERS

STOP WASTE AND LOSS



By Preventing

- Overflow of tanks
- Draining of boilers
- Air binding of pumps
- Burning out Boiler tubes
- Water contamination

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Just two polished stainless steel rods — that's all — in any vat, tank, boiler, reservoir, etc., to control signals or operate pumps or valves, automatically; they are constantly on duty — need no servicing — and are easy to install.

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Pulling forward opens the jaws that bite into obstructions. Reversing the pull on the bucket automatically closes jaws which hold load pulled back to street level. Write for complete details.

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Life, Time, or *Vogue* (his previous favorite, no less!—because of 'pretty ladies'). Now he must have *Water & Sewage Works!*

"I guess this still doesn't prove anything for the age old argument of heredity versus environment. Or does it? Frank."

* * *

Most persons I ask for items for this column say, "Aw, I don't know any stories you want," but not so Fred Gibbs of Boston. When I asked him for a contribution to the column, Fred said simply, "Will do!"

Fred, by the way, is now in business for himself (Engineering Sales Corporation—manufacturers' agent) handling several water works lines since the first of the year—No charge for the plug, Fred, but I'll take that story any day now.

* * *

"Buffalo Bodie" wants to know what that special announcement was that I promised—it seems like several months ago now.—Sorry, Chum, what with delayed issues on account of strikes, lack of space, etc., etc., and several delayed stories, that announcement will have to wait awhile —It'll keep. But two stories on Harry Jordan, a letter from John Hood, more about Sam Newkirk, another water works romance, another "small world coincidence," and items about Blucher Poole, L. E. Wickersham, and several others will have to be taken care of next month. That's thirty, Bodie. V.T.Y. Doc.

SIMPLEX

INCREASE FLOW CAPACITY 40% TO 60%

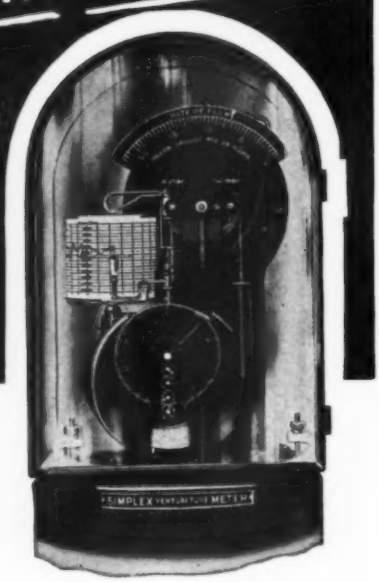
MOL or MOLA METERS

with flow ranges

FROM 20 to 1

TO 28½ to 1

OR TO 40 to 1



Two typical examples of the ease and economy of increasing the maximum capacity of flow lines with the use of Simplex MOL and MOLA wide-range meters are given below:

1. A change in operating heads enabled a large municipal water department to increase the total capacity of one of their pumps from a maximum of 60 million gallons per day to 72 million gallons per day by replacing the existing Simplex MO Meter with a Simplex MOL Meter. No change in the Venturi Tube, Pump Impeller, or motor was required, and operating costs showed a marked decrease.
2. By substituting an MOLA Meter for an MO Meter, increased requirements were met without any change in the Venturi tube, permitting an increase of from 13 million gallons per day to 21 million gallons per day.

Simplex MOL and MOLA meters are designed to function over extremely wide flow ranges — and the accuracy of measurement and totalization is maintained at both maximum and minimum ends of the range.

Look into the advantages and economies of making use of Simplex instruments for performing the extraordinary as well as the conventional metering operation.

Write today; our recommendations are made without obligation.

SIMPLEX VALVE & METER CO.

6745 UPLAND STREET, PHILADELPHIA 42, PA.

THE SPILLWAY

[Overflow from the main section]

T. R. Camp Forms Partnership with Associates

Thomas R. Camp, consulting engineer of Boston, announces the formation of a partnership with his associates, Herman G. Dresser and Jack E. McKee, to continue a consulting practice under the firm name of Camp, Dresser & McKee with offices at 6 Beacon Street, Boston. The firm will specialize in water and sewage works and the treatment and disposal of municipal and industrial wastes. Mr. Camp has specialized in hydraulic and sanitary engineering for more than 25 years, was professor of sanitary engineering at M. I. T. for 15 years, and is nationally known.

Herman G. Dresser is a graduate in Civil Engineering from Tufts College, 1923, and M.S. from Princeton, 1926. He spent nine years as designer and assistant engineer with Metcalf and Eddy, consulting engineers. From 1935 to 1944 he was principal engineer with the late Samuel M. Ellsworth and has held the same position since 1944 with Thomas R. Camp.

Jack E. McKee is a graduate of Carnegie Institute of Technology in Civil Engineering, 1936; Harvard Graduate School of Engineering, M.S. and Sc.D. in Sanitary Engineering, 1941. During the war he served as Sanitary Engineer of the Repairs and Utilities Section of the Pacific Division Engineers Office and later participated in the Normandy invasion and the campaign across Europe as sanitary engineer for military government in combat areas. Relieved from active duty as a Major, he joined Thomas R. Camp in January, 1946.

Milwaukee Refuses Water Service to Industry Outside of City Limits

Milwaukee, as in the case of many other cities, has a number of suburbs to which it supplies water through its regular pumping stations, at rates approved by the Wisconsin Public Service Commission. In many instances industrial plants have been

built just across the street from the Milwaukee city limits, not in an established suburb, and they expect water service the same as factories located within the city. The Milwaukee common council has adopted a policy in the matter, which denies water service to property outside the city limits, except on specific recommendation of the Commissioner of Public Works of Milwaukee.

The latest case to come up for decision is that of an important company which has constructed a new plant just across the street from the Milwaukee city limits. A petition for water service has been denied by the Milwaukee authorities, their position being backed by the opinion of the city attorney's office. Herbert H. Brown, superintendent of the water works, objected to the extension of the service on the grounds that if one such plant outside of the city limits were granted water service, many other non-tax-paying companies would expect the same service, thus placing a great drain on the water supply facilities of Milwaukee. —J. E. Hubel, Milwaukee.

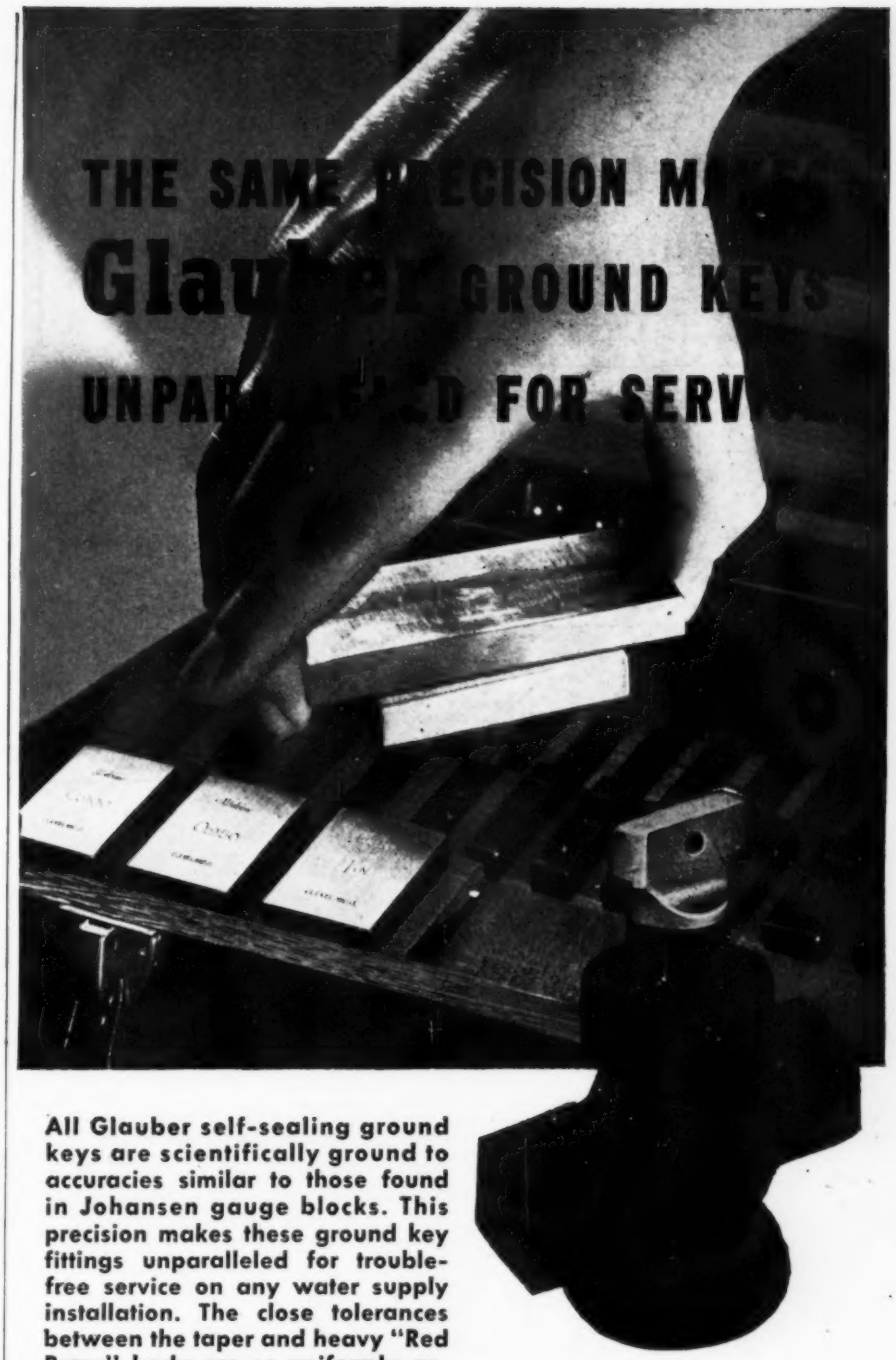
Competitive Exams for Regular Corps of the U.S.P.H.S.

Competitive examinations will be held early in 1947 for appointment to the Regular Corps of the U. S. Public Health Service. Seventy-five vacancies exist in grades of assistant and senior assistant scientists.

Written examinations, covering each candidate's particular field of science, as well as related fields, will be held April 14 and 15 at places mutually convenient to the applicant and the Service. Oral examinations will be held during the period February 13-April 9 in 30 cities strategically located throughout the United States.

Commissions are available to scientists trained in any of the following fields: *bacteriology,* mycology, entomology, malacology, biology, *chemistry,* physiology, physics, statistics (mathematical, demographic, etc.), psychologists, and milk and food specialists. Assignments will be in line with the individual's demonstrated ability and experience.

An applicant for the grade of assistant scientist must be a citizen of the United States, have seven years of educational and professional training or experience, possess a certificate or diploma from an institution of recognized standing, and be able to pass a physical examination given by a medical officer of the United

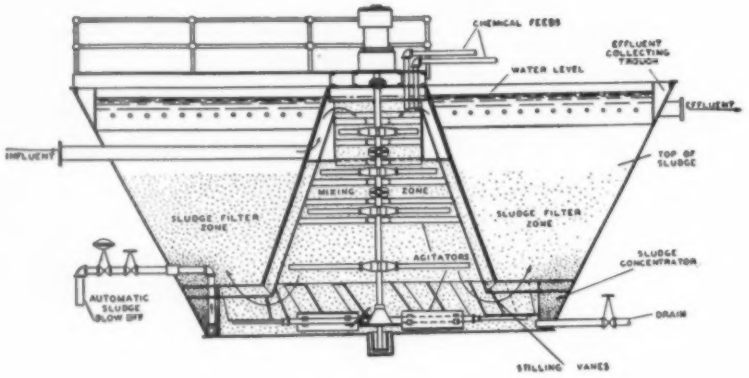


All Glauber self-sealing ground keys are scientifically ground to accuracies similar to those found in Johansen gauge blocks. This precision makes these ground key fittings unparalleled for trouble-free service on any water supply installation. The close tolerances between the taper and heavy "Red Brass" body are so uniformly accurate that a very slight tap permanently seats the plug. Yet, after years of service, these valves, which are lubricated with Glauber's Special Formula valve grease, will turn as freely as the day they were installed. Most patterns are available for immediate delivery. Write today for new catalog and quotations on your waterworks requirements.

THE Glauber BRASS MFG. CO., KINSMAN, OHIO

Division of *H. B. Salter Mfg. Co., Marysville, Ohio*

A new, more efficient means for removing impurities from municipal water supplies



PERMUTIT *(SPAULDING)* PRECIPITATOR

IN the Spaulding Precipitator, Permutit* has combined precipitation and separation in a single treatment step, so that water being treated flows clear from the top of the equipment.

The Vertical Precipitator, as shown schematically above, was the first development of this "sludge blanket" principle, which provides a sharp demarcation between sludge and clear effluent. Other designs are available.

Permutit Precipitators not only represent a more efficient means of cold lime treatment, but are more compact than older style methods. Permutit will be glad to cooperate with you and your consultants on any problem of producing a clear, soft, iron-free water. Many types of equipment are available, and more than 30 years' experience is at your service.

For full particulars write to The Permutit Company, Dept. W-2, 330 West 42nd Street, New York 18, N. Y., or Permutit Co. of Canada, Ltd., Montreal.

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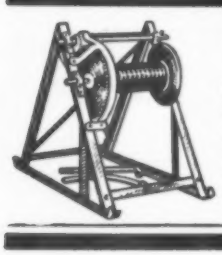
WATER CONDITIONING HEADQUARTERS

Your PIPE CLEANING PROBLEMS SOLVED



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Frame. Sturdy angle iron construction. Cable drum holds 1100 ft. of ⅜" cable. Shipping weight without cable 250 lbs.

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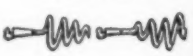

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NO. 22—SPEAR SCREW

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W.H. STEWART

1051 SOUTH CLINTON ST.
SYRACUSE, N.Y.

States Public Health Service. The same requirements, plus an additional four years of training or experience, apply to those seeking the grade of senior assistant scientist.

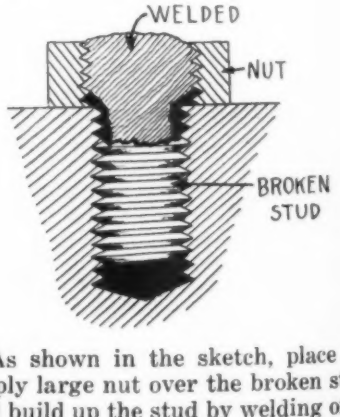
Commissioned officers in the Regular Corps enjoy the same benefits and privileges as do officers of the Army, Navy, or Marine Corps. The grade of assistant scientist is equal to that of first lieutenant in the Army. Annual pay, with allowances for dependents, is $3,811. A senior assistant scientist ranks with a captain of the Army and draws, with allowances for dependents, $4,351 a year.

U. S. Public Health Service officers are entitled to full medical care and hospitalization for themselves and their families, including disability retirement at three-fourths base pay. They receive 30 days annual leave with pay. Periodic promotions are based upon length of service and merit. The retirement age is 64.

Application forms and additional information on places and dates of examinations may be obtained by writing the Surgeon General, United States Public Health Service, Washington 25, D. C.

How to Remove Broken Studs by Welding

This sketch shows how it is done—a method that is much simpler and better than the old method of drilling, chipping and digging. Now that even the smaller plants are provided with electric welding equipment, this method is well within the reach of everyone.



As shown in the sketch, place an amply large nut over the broken stud and build up the stud by welding onto it, and then weld to the nut. In that way the broken stud and nut become one solid piece and the stud can be taken out with almost any kind of wrench. The welding process also "helps" in that it heats the stud, causes expansion, and thus aids in loosening.

Contributed by W. F. Schaphorst, M.E., Newark, N. J.

"Down Dolly!"

"Some of that vile chlorine gas they are putting in our water might work through and bleach out some of your beautiful spots, darling!"
(Cartoon by Carlson)

Post-Graduate Public Health Fellowships Available

Announcement has been made by Surgeon General Thomas Parran of the U. S. Public Health Service that post-graduate public health training for physicians and engineers for the school year beginning in the fall of 1947 are available. Applications for these fellowships will be received any time prior to May 1, 1947. The fellowships have been made possible by a grant from the National Foundation for Infantile Paralysis through funds contributed to its March of Dimes.

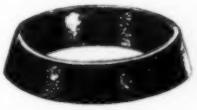
The fellowships provide an academic year's graduate training of approximately nine months in an accredited school of public health or an acceptable school of sanitary engineering followed by three months of field training. The fellowships are open to men and women, citizens of the United States, under 45 years of age. Engineering graduates with a Bachelor's or higher degree in sanitary, civil, or chemical engineering are eligible, and those with other engineering degrees who have had experience in the public health or sanitary engineering field may also submit applications.

Applicants for fellowships may secure further details by writing to the Surgeon General, U. S. Public Health Service, 19th and Constitution Ave., N. W., Washington 25, D. C., Attention Public Health Training.

In Line Jointing This Ring Makes Important Savings

1. **Use results in sterilization on first hypochlorite flushing** . . . with savings in water, hypochlorite, time and labor.
2. **Remains sterile.** Rubber cannot harbor or support bacteria. Prevents recontamination, so often traced to other packings.
3. **Secures tight seal quickly,** cutting water waste way down.
4. **Speeds repairs** by making it easy to pour dry joints. Stops water from leaking valves.
5. **Easily inserted.** Slipped onto spigot of pipe and, as pictured, it is easily positioned in joint with narrow caulking iron, applied to grooved back.

HYDE-RO Ring



SAVES ITS COST OVER AND OVER...and GIVES YOU BETTER JOINTS

- Made for 4, 6, 8, 10 & 12" cast iron pipe
- Ready for use. No measuring or cutting
- Solid Ring. No laps to take up joint space
- Packaged in cartons of fifty
- Works with Tegul-MINERALEAD, lead or Portland Cement—and on plain end or beaded pipe

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The INGOT FORM Bell & Spigot JOINTING COMPOUND

• Cuts initial leakage • Impervious to moisture • May be stored unprotected from weather • Easy to work • Needs no skilled labor or deep bell holes • Super resistant to mechanical and thermal shock • Can't change in physical composition.

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Changes in pipe diameter, grades, bends and valves did not stop the National Water Main Cleaning Co. from cleaning eleven miles at a stretch in a line between Gamboa and Miraflores, Panama Canal Zone. The machine first traversed seventeen thousand feet of 30" pipe; opened automatically to clean the next nineteen thousand feet of 36" pipe, passing through 30" gate valves enroute; and then, without slackening speed, passed into a 30" line and cleaned another twenty-one thousand feet. Thus, the entire fifty-eight thousand feet were cleaned with but a single entry. The machine's operation was controlled by telephone and two-way radio. There was no interruption in service and the longest shut-off was eleven hours.

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The technical skill and experience that enable National to perform this feat will enable us to clean your mains more effectively, with fewer pipe openings, in less time.

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KNOWN AROUND THE WORLD AS THE SIGN OF EXCELLENCE IN WATER TREATMENT EQUIPMENT

The years of experience behind the Roberts nameplate is your assurance that any water rectification problem is expertly handled to your best advantage. As manufacturing and installation engineers, the Roberts organization is equipped to meet your exact needs regardless of the size of the equipment or the complexity of the problem.

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We invite your inquiries

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Standard Practices for Stationary Diesel Engines
(Book Review)

The Diesel Engine Manufacturers' Assoc. has issued the third edition of its *Standard Practices for Low and Medium Speed Stationary Diesel Engines*. This edition has, like its forerunner, been produced with the sole aim of being of service to diesel engine users, prospective buyers, and consulting engineers. According to the foreword, it covers stationary diesel engines at speeds up to and including approximately 750 rpm., and this edition supersedes all previous editions of these Standards.

Chapter I is devoted to definitions of various terms used in the diesel engine field, and Chapter II is devoted to standard performances and equipment. The book contains 15 other chapters devoted to various subjects, including construction, speed regulators, vibration, intake and exhaust system, cooling water system, lubricating oil system, and selection of engine sizes, as well as chapters on fuel oil storage, generators, erection of engines, lubricating oil, etc.

Of particular interest to persons in water and sewage works are the chapters on performances and equipment, selection of engine sizes, heat recovery apparatus, cooling water systems, and the sections on lubricating oil and fuel oil.

The book has been published by Diesel Engine Manufacturers' Assoc., 1 N. LaSalle St., Chicago 2, Ill., and retails for $2.50 per copy.

Proceedings of Purdue Second Industrial Waste Conference Available

The Proceedings of the Second Industrial Waste Conference, held at Purdue University, January 10-11, 1946, has been published as Extension Series No. 60 of The Engineering Extension Dept., Purdue University.

The bulletin contains the complete manuscripts of 25 papers including 12 papers on the various workshops, as well as the discussions of the various workshops on milk wastes, food processing, oil refinery, paper manufacturing, metal plating, etc.

It is interesting to note that of the 254 persons registered for this Industrial Waste Conference, there were 29 food canners, 26 equipment manufacturers, 23 state government officials, 23 sewage treatment plant operators, 20 metal products manufacturers, 18 university students, 17 representatives of colleges and uni-

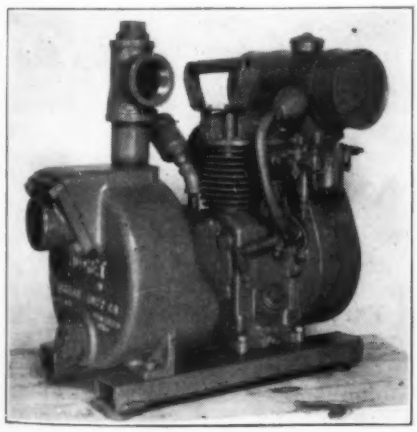
versities, 11 each of consulting engineers, dairy products manufacturers, brewers and distillers; 10 each of paper manufacturers and federal government officials; 8 water treatment plant operators, 7 oil refiners, 6 magazine and newspaper representatives, etc.

For persons interested in the problems of industrial waste treatment, this bulletin is a valuable addition to the proceedings of the first conference. It may be obtained by writing Prof. Don E. Bloodgood, Dept. of Civil Engineering, Purdue Univ., West Lafayette, Ind.

MANUFACTURERS' and EQUIPMENT NEWS

Midget Aluminum Pump

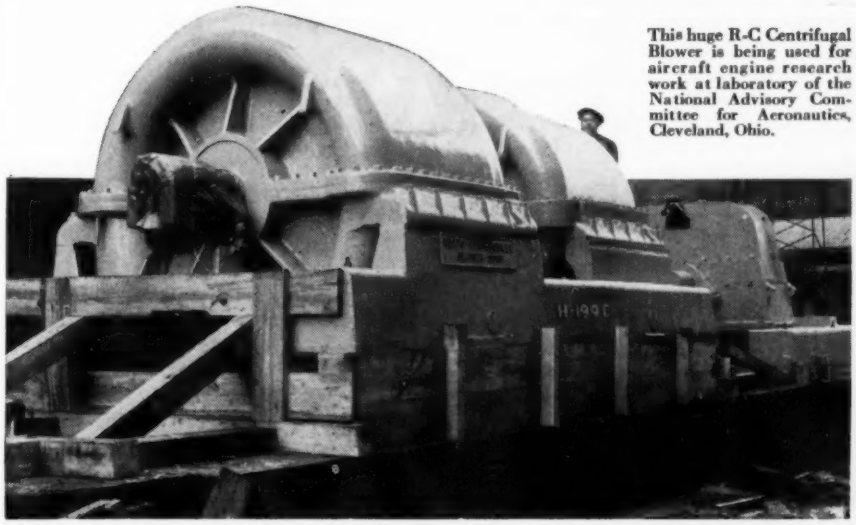
Gorman Rupp Co. has a unique midget aluminum pump that weighs only 60 lb., comes with gasoline engine attached, has a suction lift of 28 ft., primes automatically after initial filling, is completely portable, and can be transported by one person.



This pump will discharge 4,800 gph. at a total head of 20 ft., including a 5-ft. suction lift. Known as the Midget, this pump has three companion pumps, the Bantam, the Hawk, and the Eagle, all light weight, the latter with a capacity of 15,000 gph.

Further information may be obtained from the Gorman-Rupp Co., Mansfield, Ohio.

Freight car loaded with **WIND**



This huge R-C Centrifugal Blower is being used for aircraft engine research work at laboratory of the National Advisory Committee for Aeronautics, Cleveland, Ohio.

This freight car packs hurricanes! It's loaded with a Roots-Connersville Centrifugal Blower that in just one minute can push the air out of a circular tunnel 10 ft. in diameter and 450 feet long. Or, it can blow a gentle breeze, too, if that's what is wanted.

Your needs may not call for blowers of this size—you may want less or more capacity. Whatever you need, you can get it in Roots-Connersville equipment. And, because we design and build both Centrifugal and Rotary Positive units, we can supply without prejudice the type best suited to your specific requirements. That's R-C *dual-ability*.

Large and small communities have depended for years upon Roots-Connersville Blowers for sewage treatment. That's because they're sturdy and reliable and can be adapted to any modern type of drive.

For long-time satisfactory blower performance, call on R-C *dual-ability*, based on almost a century of blower experience.

ROOTS-CONNERSVILLE BLOWER CORPORATION
702 Mount Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE ROTARY CENTRIFUGAL
BLOWER BUILDERS R-C SINCE 1854
BLOWERS · EXHAUSTERS · BOOSTERS · LIQUID AND VACUUM PUMPS · METERS · INERT GAS GENERATORS

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Diesel Engine Manufacturers' Annual Meeting

Kettering Principal Speaker

As principal speaker at the annual meeting of the Diesel Engine Manufacturers' Association (D E M A), Charles F. Kettering, General Manager, Research Division, General Motors Corp., developed the topic "What Is Our Competition?" According to Mr. Kettering, progress in Diesel engine development, as in anything else, is made by daring to deviate from established schools of thought. Actual performance of engines occasionally crosses up the most elaborate calculations of the theorist.

Left to Right, Speakers' Table: Robert H. Morse, Jr., Vice President, Fairbanks, Morse & Company; George W. Codrington, Vice President, General Motors Corp., and General Manager, Cleveland Diesel Engine Division; Charles F. Kettering, Vice President and General Manager, Research Division, General Motors Corporation; E. J. Schwanhausser, Vice President, Worthington Pump & Machinery Corporation; Robert E. Friend, President, Nordberg Manufacturing Co.; Gordon Lefebvre, President, Cooper-Bessemer Corporation.

Another high point in the meeting was a day and a half session of Chief Engineers of DEMA member companies. Twenty-six men participated. Organization of a Diesel engine manufacturers' engineering department, standard practices, and research programs were discussed. Gordon Lefebvre, Chairman of the Educational Committee, led a discussion on the relationship between Diesel engineering departments and engineering colleges.

Officers elected for the coming year were:

President

E. V. Schwanhausser, Vice Pres., Worthington Pump & Machinery Corp.

Vice Presidents

J. E. Peterson, Vice Pres., General Machinery Corp.

Gordon Lefebvre, Pres., Cooper-Bessemer.

Treasurer

Robert H. Morse, Jr., Vice Pres., Fairbanks Morse & Co.

Rockwell Co. Makes Three New Appointments

A. E. McIntyre Heads Meter Division

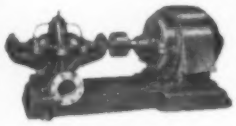
Three new appointments to the executive staff of Rockwell Manufacturing Co., Pittsburgh, have been announced recently. These include C. A. Wiken, formerly chief engineer of the Delta Mfg. Div., Milwaukee, now Vice Pres. in Charge of Engineering; J. E. Ashman, formerly with U. S. Steel as Director of Procedure for Carnegie-Illinois, now Controller of Rockwell Mfg. Co.; and A. E. McIntyre, for the past several years manager of the Nordstrom Valve Div. plant in Oakland, Cal., now General Mgr. of the Pittsburgh Equitable Meter Division.

PEERLESS

(FORMERLY DAYTON-DOWD)

CENTRIFUGAL PUMPS

Built for Regular or Special Pumping Applications where Temperatures and Pressures are Variable, and Normal, Dense or Viscous Liquids are to be Handled. Types illustrated represent a few of scores of Peerless Centrifugal Pumps for industrial application.



Type A CENTRIFUGAL PUMPS

For General Services. Capacities: Up to 60,000 g. p. m.

Type B CENTRIFUGAL PUMPS

For Boiler Feed, Refinery and Pipe Line Service. Pressures to 7001bs.

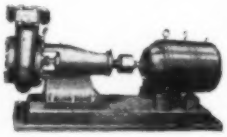
Type AF FIRE PUMPS

(Formerly Dayton-Dowd)

Underwriters Approved. Capacities: Up to 2,000 g. p. m.

Type XT (VANE) PUMPS

For Butane-Propane, Processing and General Service. Capacities: Up to 150 g.p.m.



Type DS CENTRIFUGAL PUMPS

For Chemical, Oil, Food Processes, etc. Capacities: Up to 600 g. p.m.

PEERLESS UTILIZES ADVANCED PRINCIPLES OF HYDRO-DYNAMICS

Peerless Horizontal Centrifugal Pumps (formerly Dayton-Dowd) are available in sizes, pressures and capacities for practically all pumping services. They are being used to most efficiently serve applications in all industries where continuous, heavy duty pump performance is required affording long-lived, trouble-free service with a minimum of maintenance.

Contact or write your nearest Peerless distributor for engineering data and full details of Peerless Centrifugal Pump advantages.

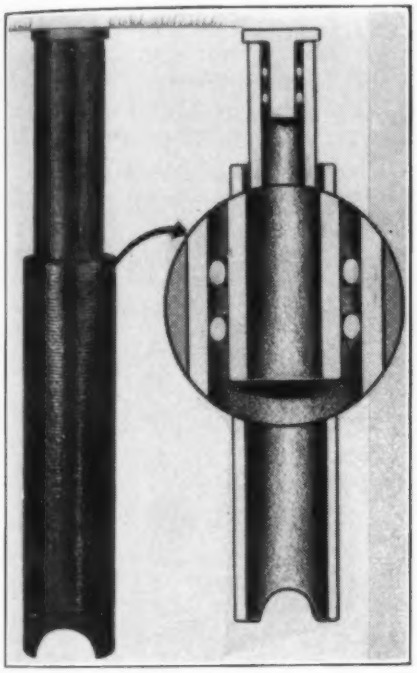
PEERLESS PUMP DIVISION

FOOD MACHINERY CORPORATION

Factories: 301 W. Avenue 26, Los Angeles 31, Calif.; Quincy, Illinois; Canton 6, Ohio

Shock-Proof Curb Service Box

The Pilot Engineering Service of Milwaukee has developed and is now marketing a new type of curb service box called the G-H Shock-Proof Curb Service Box. Made of fibre pipe construction, the box has the unique feature of four rubber rings which not only take up any surface shocks but make the box adjustable as well. This box is light and easy to install, cannot shear the service pipe, cuts maintenance costs because it lasts a lifetime. Furthermore it is resistant to freezing, and its lightness makes for ease of handling.



The new box is available in lengths and sizes to meet various grade conditions. Caps for the service box are available for either water or gas installations.

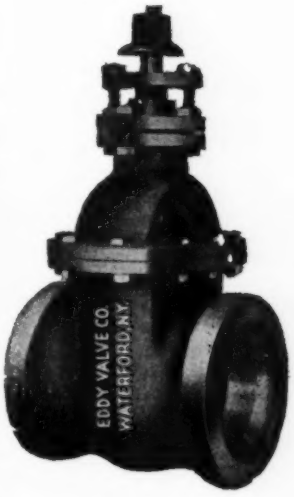
Further information on the G-H Shock-Proof Curb Service Box may be obtained from the Pilot Engineering Service, 3804 N. Fratney St., Milwaukee 12, Wisc.

(Ed. Note: This item is being repeated from our December issue due to the fact that the printers used the wrong closing paragraph. As a result the manufacturer's name and address appeared to be the Combustion Control Corp. of Cambridge, Mass., instead of Pilot Engineering Service of Milwaukee.)

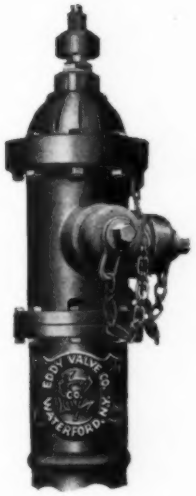
Dresser Appoints Two Southeastern Representatives

Dresser Manufacturing Division, Bradford, Pa., has announced the appointment of two new manufactur-

for permanent satisfaction—specify



Eddy
VALVES & HYDRANTS



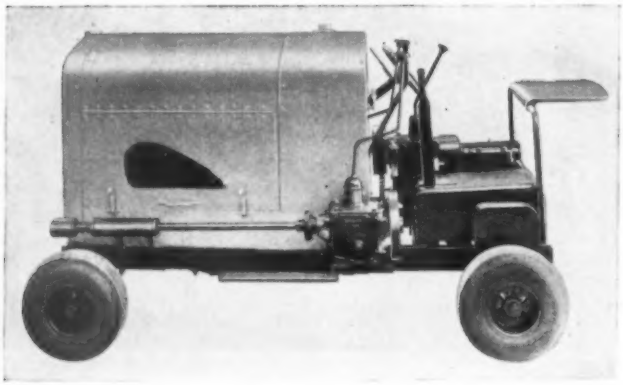
"Permanent Satisfaction" is assured when you buy and install Eddy water works products. Three generations of men who "know how", assure that "permanent satisfaction" is built into every product that bears the name EDDY.

We have the valve or hydrant you want—chances are we have it in stock ready for immediate delivery. Specify EDDY — for "Permanent Satisfaction".

EDDY FOR LONG SERVICE

EDDY
VALVE COMPANY
WATERFORD, NEW YORK

1947 MODEL



PARTICULARLY FOR
4,6,8" Pipe Cleaning

Do You Need Larger Pipe?

5 YEARS AGO, THIS HAPPENED:

A resident in a city of 60,000 people told one of our men that his flushometers would no longer work and that the plumber said, "All of the people here will have to put in tank toilets as the water pressure has gone down." Our man looked at the water tower serving the section. He was told no houses had been built in ten years. The water department told him the services needed cleaning. This was done without any improvement. As a matter of advertising, we cleaned the 4" main to the 12" feeder and the owner's valves have worked perfectly ever since. However, the city did nothing and almost all other residents have been forced to put in tank toilets, a total cost of at least ten times the cost of cleaning. This city will soon be forced to clean for fire protection. Are you "Robbing Peter to Pay Paul?"

FLEXIBLE UNDERGROUND PIPE CLEANING CO.

9059 Venice Blvd., Los Angeles, California

855 Board of Trade Bldg. Chicago 4, Ill.
401 Broadway New York 13
147 Hillside Ter. Irvington, N. J.
P. O. Box 165 Atlanta
1624 Harmon Place Minneapolis 3, Minn.
29 Cordan Ave. Roslindale 31, Mass.
P. O. Box 694 Pittsburgh
P. O. Box 447 Lancaster, Texas
41 Greenway St. Hamden, Conn.

AMERICAN GAS BOILERS
STEAM AND WATER TYPES
for Digester Heating

FOR RATINGS AND DATA SEE OUR PAGE IN THE 1946 ANNUAL REFERENCE SECTION

American Radiator & Standard Sanitary Corporation, Pittsburgh 30, Pa.

AMERICAN-Standard
HEATING PLUMBING
Serving the Nations' Health and Comfort

SALES OFFICES IN PRINCIPAL CITIES

er's representatives for the southeastern state. Jack P. Orr, Memphis, Tenn., will handle the distribution of Dresser pipe line products in Kentucky, western Tennessee, northern Mississippi, Arkansas, and Missouri. Mr. Orr has been active in the water works field for the past 18 years, representing such companies as The Rensselaer Valve Co. and others.

Preston S. Avery, Atlanta, Ga., will be the new representative in North and South Carolina, Georgia, Florida, Alabama, southern Mississippi, and eastern Tennessee. Mr. Avery has been well known in the water works field since 1924.

Rossiter S. Scott, Dresser's Water Works Engineer, will continue his activities in this area in the interests of water supply lines, and will be available for consultation and discussion as in the past.

Frazza New Ass't Mgr. Transite Pipe Section of Johns-Manville

Lou Frazza, who for the past eight years has been the New Jersey Sales Representative of Johns-Manville Transite Pipe, has been promoted to the position of Assistant Manager of the Transite Pipe Section of the Industrial Products Division of the New York District of Johns-Manville.

Bailey Meter Expands Field Force

Bailey Meter Co. has discovered their reconversion program necessitates a large demand for trained meter and control engineers. To fill the vacancies, 14 young men, all of whom were in the armed forces or Merchant Marine, are now taking a six month course in instrumentation and control. At the expiration of the course they will join Bailey Meter's field staff of approximately 90 engineers in over 30 locations throughout the U. S. and Canada.

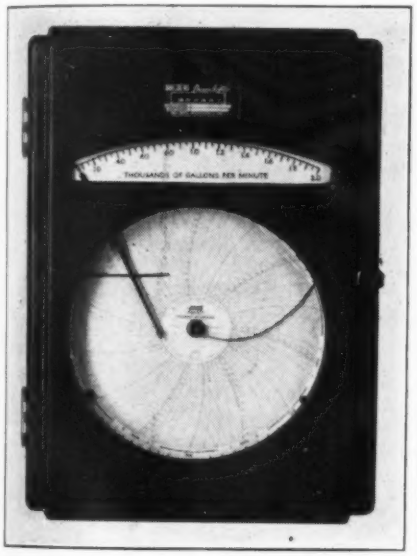
R. E. Sprenkle, who is Hydraulic Engineer for the company, is acting as Director of Education in charge

of the training of these men, and this training includes groundwork in combustion and automatic control problems as they apply to power plants and industrial processes.

The company has also announced that another cadet training course will commence on or about July 1 and applications from recent engineering graduates are now being accepted. Write the Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, Ohio.

New Totalizer Indicator Recorder

Builders-Providence, Inc., has announced a new electrically operated secondary instrument for use with Propeloflo, Shuntflo or other mechanical flow meter, or as a Recording-Indicating - Totalizing Tachometer. The instrument is actuated by impulses over a two-wire circuit from



a transmitter which is mechanically driven by the primary meter. No power is necessary for the primary instrument.

The instrument provides readings of total flow rate of flow and a chart record of flow over any distance from a few feet to many miles from the primary instrument.

Complete information on the new recorder may be obtained from Builders-Providence, Inc., Providence, R. I.

Allis-Chalmers Changes Field Organization

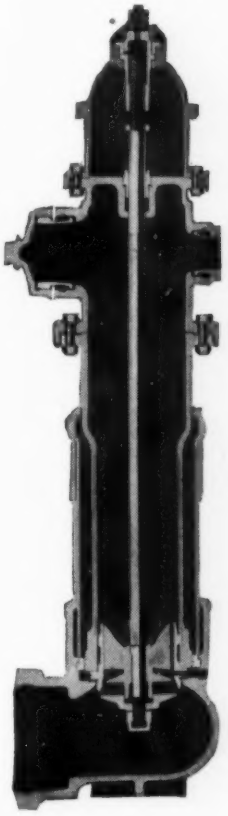
The Allis-Chalmers Co. of Milwaukee has announced a change in policy in respect to its field organization, which hereafter will be grouped according to location and similar interests under the direction of regional managers. Each regional manager will have a staff of specialists and the regions will operate as self-contained field units.

To head up these various regions the company has appointed W. F. Taylor in the New England area with an office in Boston; D. S. Kerr in the southeast with an office in Atlanta, Ga.; J. L. Pratt in the southwest with an office in Dallas, Tex., and A. J. Schmitz in the Pacific Coast area with an office in Portland, Ore.

Wood and Preuit New Engr. Equip. Co.

Alan A. Wood and Richard I. Preuit have announced the formation of Wood and Preuit Engineering Equipment Co. in Washington, D. C. Associated with the company are Conrad C. Wilbur and David A. Wood.

The new company will be located at 1018 18th St., N. W., Washington 6, D. C.



FEBRUARY IS JUNE TO A MATHEWS

The colder the weather, the tougher the job of fighting fire. But so far as hydrant service goes, no fireman ever worries about a Mathews.

Mathews Hydrants are independent of the weather. No machined part is exposed to water. The stem thread cannot freeze to the nut. The lower end of the stem is sealed by a lock nut against contact with water. The drain valve drains perfectly dry, the main valve cannot leak. Free to move up and down, the "Sand-Spun" protection case takes the thrust of the freezing earth. And, to cap this remarkable assembly, a malleable iron shield operating nut protects the revolving nut against rain, snow, or dust.

Behind the Mathews is more than 75 years' experience in quality-hydrant building. Give *your* community the extra safeguard of Mathews protection.

OTHER FEATURES OF MATHEWS LEADERSHIP

Barrel, containing all working parts, is removable • Repair or replacement is entirely above-ground • Head can be rotated a full circle, on swivel flange • Replaceable head permits change in nozzle outlets • Nozzle levels can be raised or lowered • Barrel screws into bronze bushing in elbow • Operating thread (easily accessible) is only part that needs oiling • A modern barrel makes even the oldest Mathews good as new.

MATHEWS HYDRANTS

Made by **R. D. WOOD COMPANY**

PUBLIC LEDGER BUILDING, INDEPENDENCE SQUARE, PHILADELPHIA 5, PA.

Manufacturers of "Sand-Spun" Pipe (Centrifugally Cast in Sand Molds) and R. D. Wood Gate Valves

Leeds & Northrup Receive Chamber of Commerce Award for Industrial Relations

Leeds & Northrup Co., makers of electrical instruments, was awarded the first annual Industrial Relations Award of the Chamber of Commerce and Board of Trade in mid-January. The award, a silver plaque, was presented by William L. Batt, president of SKF Industries, to Charles S. Redding, president of Leeds & Northrup.

The award is presented for outstanding attainment in the field of industrial relations.

Aluminum Solder Available

A new aluminum solder called "Prolyt" which uses no flux or flux substitute, is now available from the Aluminum Solder Corp. of New York. This Swiss development has been made available to this company.

With Prolyt, sheet aluminum, electrical wiring or other aluminum equipment can be soldered with greater simplicity and with less danger of corrosive agents weakening or marring the joints.

Further information may be obtained from the Aluminum Solder Corp., 10 E. 52nd St., New York 22, N. Y.

G.E. Tri-Clad Vertical Induction Motor

The General Electric Co. has announced a new motor designed specifically for pump drives. This is a hollow shaft vertical motor of the tri-clad induction motor type. It is available in ratings from 1 to 500 hp., all speeds and frequencies. The new motor is suitable for use on irrigation projects, deep well turbine pumps, municipal and industrial water supply projects, as well as mine dewatering pumps and process industry liquid pumps.

Further information on this new motor may be obtained from the General Electric Company, Schenectady, N. Y.

L. O. Keener Joins Clay Sewer Pipe Assn.

The Clay Sewer Pipe Association has announced the addition to its technical staff of L. O. Keener, formerly Assistant Superintendent of Highways for Westmoreland County Commissioners in the Pennsylvania Dept. of Highways.

This new publication describing meters for sewage, industrial wastes, sludge and irrigation water should be part of your file on flow measurement. Ask for Bulletin 62.

FEATURES of
BAILEY OPEN CHANNEL METERS

1. Low Cost
2. Easy to Install
3. Easy to Maintain
4. Retain Accuracy
5. Self-Cleaning
6. Adjustable Capacities
7. Indicate, Record and Integrate
8. Totalize Multiple Flows
9. Rate of Flow and Ratio Controls
10. Simple Chemical Feed Controls

MU21

BAILEY METER COMPANY
1029 IVANHOE ROAD • CLEVELAND 10, OHIO
Meters and Controls for Sewage and Water
VENTURI TUBES, FLUMES, WEIRS, NOZZLES, ORIFICES • DIRECT MECHANICAL AND REMOTELY LOCATED REGISTERS • AIR-OPERATED, ELECTRONIC AND ELECTRIC CONTROLS.

Mr. Keener has also been director of streets and public improvements of Greensburg, Pa., where he will maintain his home and represent the Clay Sewer Pipe Association in the Commonwealth of Pennsylvania.

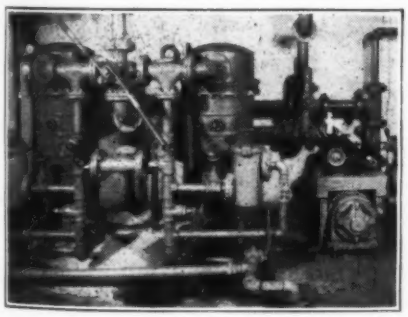
Le Roi Buys Cleveland Rock Drill Co.

Le Roi Co., Milwaukee, Wis., manufacturers of internal combustion engines, portable compressors, engine-generator sets, etc., has announced purchase of the Cleveland Rock Drill Co. of Cleveland, Ohio.

Russ Morgan, formerly secretary and sales manager of the Cleveland Rock Drill Co., will head the expanded facilities.

"Pur-O-Cel" Pressure Filter

A new "Pur-O-Cel" water filter is now available for small water treatment plants and swimming pools, making filtering a simple, mechanical operation, not a chemical process, and requiring no skilled operators. This filter, perfected in war service, utilizes thin mats of diatomaceous earth rather than a sand bed. It produces clear, brilliant water, removing amoebic dysentery cysts and bacteria. Due to its compactness and rapid filtration rate, the "Pur-O-Cel" filter is much smaller than a sand filter of the same capacity and thereby saves floor space and reduces building costs. Backwashing of the filter for cleaning is easily accomplished without disassembling the unit and with a comparatively small volume of water.



"Pur-O-Cel" is manufactured by %Proportioneers, Inc.%, 9 Codding St., Providence 1, R. I.

The **LONG** *and* **SHORT** *of*
Electrically Operated
VALVES

MOTORIZED operation of Valves is a field in itself. When purchasing these relatively expensive and technical units, you will want to feel sure your supplier has had ample experience. Costly mistakes can be, and have been made through inexperience.

This company has supplied thousands of such Valves over the course of many years—and covering a wide variety of service conditions.

The services of our Engineering Dept. are at your disposal without obligation.

Shipments are relatively long; you will want to order now for projects next summer.

RENSSELAER VALVE CO.

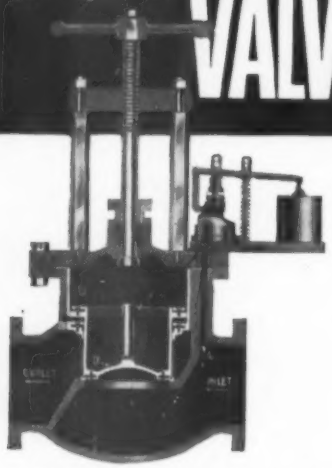
TROY, N. Y.

for CONCRETE *and* STEEL!

Inertol Protection Means Lowest Cost Per Year

INERTOL COMPANY, INC. NEWARK 5, NEW JERSEY and SAN FRANCISCO 7, CALIFORNIA

GOLDEN-ANDERSON
ELECTRIC and MANUAL
WATER SERVICE
VALVES



Suitable for any spray service requirement or for remote electrical control. Instant manual or automatic operation. For any high or low pressure water service valve need—get the facts from Golden-Anderson. Over 1500 standard types and sizes.

GA
GOLDEN-ANDERSON
VALVE Specialty Company
PITTSBURGH 22, PA.

LEADITE
The Pioneer Self-Caulking Material for C.I. Pipe

50 YEARS PROVE IT!

• Tested and used by engineers, water works men and contractors for more than 50 years, LEADITE has proved its dependability under most every condition of water main construction . . . proved that it makes a good tight lasting joint that improves with age.

THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia 2, Pa.

No Caulking

S. R. Williams Heads Worthington's Foreign Business

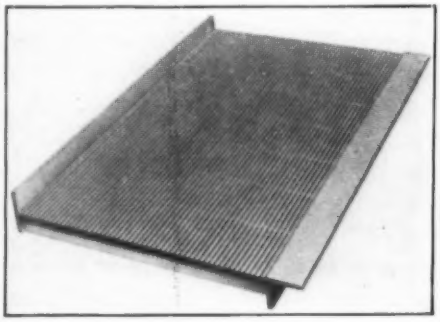
S. Riley Williams has been elected to the position of Vice President of the Worthington Pump & Machinery Corp. and will be in charge of foreign business. Mr. Williams has been

with the company since 1920 and during the recent war served as Vice Pres. in charge of operations. In 1945 he was appointed Director of International Business.

In his new capacity he will have responsibility for Worthington products for export as well as administration of Worthington associated companies in South America and Europe. His headquarters will continue at the Harrison, N. J., office.

Wedge Slot Screens

The Wedge Slot Screen, produced by the Hendricks Mfg. Co. of Carbondale, Pa., is designed with a continuous slot for particular use in water and sewage plants. This screen is made of deep profile bars varying in bar size according to requirements of strength and rigidity. It



can be adapted for any standard equipment such as trash racks, garbage grinders, sewage screens, water intakes, and so forth.

On sewage disc screens such as the Reinsch-Wurl, the Wedge-Slot provides high recovery of solids without blinding. For water intake and sewage screens the slot can be simply cleaned with rakes, either hand or mechanical, and is not subject to blinding from leaves or other debris.

Further information on the Wedge Slot Screen may be obtained from the Hendricks Manufacturing Co., Carbondale, Pa.

WRITE FOR THIS BULLETIN

FOR
pH Control
and WATER TESTS

A study of our 28-page Bulletin No. 602, containing the complete line of Hellige apparatus for pH control and water analysis, will enable you to form an intelligent opinion as to what is best suited for extending your present equipment or for an initial installation.

HELLIGE
INCORPORATED
3718 NORTHERN BLVD., LONG ISLAND CITY 1, N.Y.
HEADQUARTERS FOR COLORIMETRIC APPARATUS

PROTECT
idle meter parts against indoor rust

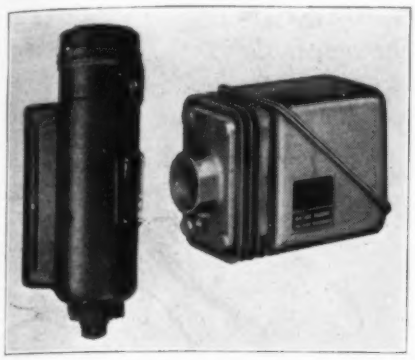
THE cost of Oakite-protection for idle meter parts awaiting assembly in storage room or shop is so small that you cannot afford to overlook it. Oakite Special Protective Oil coats iron and steel parts with a thin, transparent film that shuts out indoor moisture. Easy to apply and remove. Wet parts need not be dried. Film does not hamper inspection or "mixing". Economical dilution ratios. Write on letterhead TODAY for FREE 16-page booklet of facts.

OAKITE PRODUCTS, INC.
73 Thames Street, NEW YORK 6, N. Y.
Technical Representatives in Principal Cities of U. S. & Canada

OAKITE
Specialized Industrial Cleaning
MATERIALS • METHODS • SERVICE

Electronic Combustion Safeguard System

The Fireye Combustion Control Type F18TS is a single unit designed to protect commercial and industrial oil burning equipment against flame failure and low boiler water level.



An electric eye which "sees" the flame and sounds an alarm when the flame fails, this Fireye unit also carries a single probe which warns when the water level reaches a predetermined low point.

Further information on the Fireye Electronic Combustion Safeguard System may be obtained from the Combustion Control Corp., 77 Broadway, Cambridge 42, Mass.

J. S. King Chicago Branch Mgr., Fairbanks, Morse

Fairbanks, Morse & Co. has announced the appointment of John S. King as Manager of the Chicago Branch House of the company. Mr. King succeeds Frank V. Roy, who retires from that position on March 1.

Mr. King has been with the company since 1921 and has served in various capacities in the sales force and production management, as well as on the executive staff. His most recent position was Manager of the Pump Division and Assistant Manager of the Railroad Division.

Changes at Carborundum's Refractories Division

The Carborundum Co. has announced the following changes in its Refractories Division's sales organization:

Robert A. Barr, formerly District Sales Mgr. of the Chicago territory, is now Assistant Sales Mgr. in direct control of the Division's field sales force, at Perth Amboy, N. J.

Arthur A. Turner will be in charge of the Sales Development Dept. as Technical Assistant Sales Mgr. and will also be located in Perth Amboy.

Richard D. Rudd, formerly with Certain-Teed Products, will serve as Refractories Engineer in Chicago, succeeding Mr. Barr, and D. Worth Polhemus has been transferred from Cincinnati to the Philadelphia district, while J. H. Wisby will take over as Refractories Engineer.

New Check Valve

A new check valve for small lines developed by Mansfield & Green, Cleveland, combines a unique but simple double seal which completely

eliminates leakage and loss of pressure even with grit in the system. With grit .010 in. in diameter the

PUR-O-CEL

DIATOMACEOUS EARTH FILTER

%PROPORTIONEERS, INC.% announces the new Pur-O-Cel pressure filter for small water treatment plants. Perfected during the war, this new filter utilizes thin mats of interlaced particles of diatomaceous earth instead of a sand bed . . . with many outstanding advantages over conventional sand filters:

1. Complete turbidity removal. Produces clear, brilliant water.
2. High bacteria removal. Filters out amoebic dysentery cysts.
3. High filtration rates. Safe filtration at any flow rate.
4. Reduced space requirements. Saves construction and housing costs.
5. Simpler operation. Filtering becomes a mechanical operation, not a chemical process.

Write today for Bulletin 1550

% PROPORTIONEERS, INC. %

9N CODDING ST., PROVIDENCE 1, R. I.

MR. SUPT:—

Sure! You can superchlorinate and avoid high residual chlorine taste when—

you post-treat with Virginia's "ESOTOO".

Write us today.

VIRGINIA SMELTING COMPANY
WEST NORFOLK · VIRGINIA

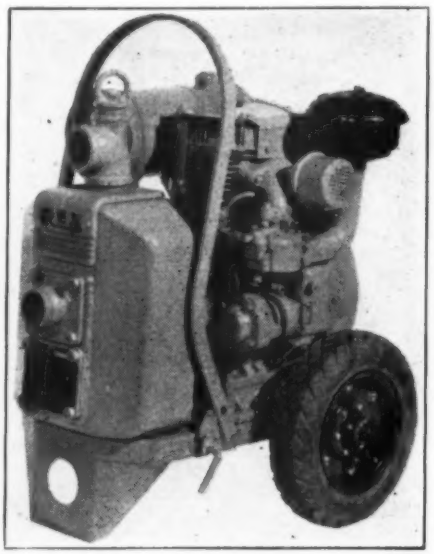
valves show no leakage or seepage at any pressure up to 10,000 psi.

The double seal principle utilizes a metal to metal seat plus a resilient rubber or synthetic rubber ring seal on the check valve poppet. The line pressure forces the resilient ring to the metal seat, which force increases with increase of pressure resulting in greater sealing force at higher pressures.

Available sizes range from ⅛ in. to 1 in. SPT for pressures to 10,000 psi., and any media not destructive to rubber or synthetic rubber. Further information may be obtained from Mansfield & Green, Cleveland, O.

Chain Belt Announces New Steel Pump Line

The Chain Belt Co. has announced the production of a new line of Rex Press-Formed Self Priming Centrifugal Pumps, which combine attractive appearance with many unique features of construction.



The pump body is press-formed of Armco Ingot Iron, which is highly resistant to corrosion. Another advantage of the new design is the great saving in weight. In the 2-in. size, for example, the new pump weighs 90 lbs. less than the former cast iron design. Pumping efficiency has been improved, and a faster prime is assured by an improved method of priming.

For additional information about this new Rex pump, write Chain Belt Co., 1600 W. Bruce St., Milwaukee 4, Wis.

Graver Buys Banks Moreland of Houston

Graver Tank & Mfg. Co. of East Chicago, Ind., has announced that the Banks Moreland Company of

TAYLOR COLOR STANDARD SLIDES

enable you to determine

pH • CHLORINE • COLOR • COPPER
MANGANESE • FLUORIDE • ETC.

simply by selecting the proper slides to use with the WATER ANALYZER

There's the Value!

VALUABLE FREE BOOK!

Illustrated, 88-page "Modern pH and Chlorine Control" solves many water purification problems. Gives theory and application to 34 different industries. Tells how Taylor makes determinations easy, simple, economical! Illustrates and describes Taylor outfits. See your dealer today, or write:

W. A. TAYLOR AND CO.
7308 YORK RD. • BALTIMORE-4, MD.

INSTALLATIONS WORLD WIDE

LARGEST CITY TO SMALLEST VILLAGE

VALVES COMPLETE EQUIPMENT FOR WATER WORKS FILTRATION AND SEWAGE DISPOSAL PLANTS LATEST "COREY TYPE" HYDRANTS

Write for Catalogue and Information

IOWA VALVE CO.

General Offices:
Hubbell Bldg., Des Moines, Iowa

Plant:
Oskaloosa, Iowa

MUELLER-COLUMBIAN GATE VALVES

The only gate valves with the FOUR POINT WEDGING principal of construction.

MUELLER CO.

Houston, Tex., has been purchased and will continue to operate in the southwest as Banks Moreland Company, a division of Graver Tank & Mfg. Co., Inc.

The new division will be under the management of Banks Moreland, who has been made a vice-president of the Graver Tank & Mfg. Co., Inc.

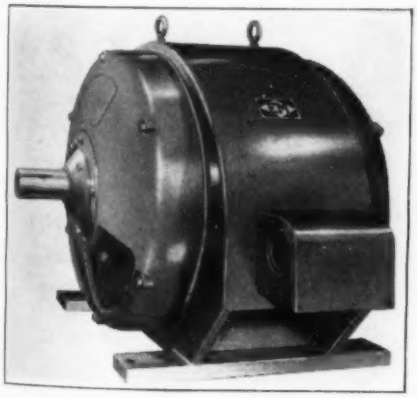
Bruno Auger Bit Set

Bruno Tools of Beverly Hills, Calif., have announced a new auger bit set for fast, easy wood-boring. The set consists of an 8¼-in. shank

with either six or eleven boring heads from ⅝ to 1¼-in. by eights or sixteenths. The latter set is shown in the accompanying cut. The auger bit set may be obtained from Bruno Tools, 9330 Santa Monica Blvd., Beverly Hills, Calif.

Heavy Duty Squirrel Cage Induction Motors

Electric Machinery Mfg. Co. of Milwaukee has announced a new heavy-duty squirrel cage induction motor, now available for large power drives from 100 to 1000 hp. These motors run at 1800 rpm. and lower



speeds and are designed with drip and splashproof construction. Sealed bearings can be cleaned and refilled without motor disassembly. Double end ventilation is provided by a blower on each end of the rotor.

A folder on this new motor may be obtained from Electric Machinery Mfg. Co., Minneapolis 13, Minn.

CEMENT GUN COMPANY

"GUNITE" CONTRACTORS

GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.

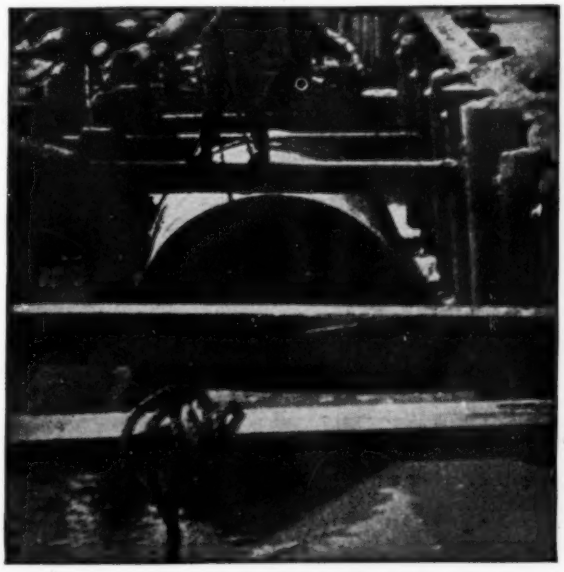
DAM REBUILT WITH "GUNITE"

This is Lower Doughty Pond Dam belonging to the Atlantic City, New Jersey, Water Department, a poured concrete structure with fresh water upstream and tide water at the downstream toe. This structure became seriously disintegrated and eroded as shown in the left hand photo, and was completely restored with "GUNITE" a minimum of six inches in thickness with double mesh reinforcement.

The right hand view shows the finished job completed by us in 1941. Both the upstream and downstream faces were restored with "GUNITE," as well as the wing walls.

Our 72-page general bulletin C2300 describes this and scores of other uses of "GUNITE." We will be glad to send it to you upon request.

MANUFACTURERS OF THE "CEMENT GUN"



84" pipe—Spring Lake, N. J.

FLANGED PIPE

FLEXIBLE JOINT PIPE

BELL & SPIGOT PIPE

SPECIAL CASTINGS

SHORT BODY BELL & SPIGOT SPECIALS

Large stock enables us to make prompt shipments.

CAST IRON PIPE

SIZES 2" TO 84"

Warren Foundry & Pipe Corp.

11 Broadway, New York

Warren Pipe Company of Mass., Inc.

L&S

STEVENS

WATER LEVEL

RECORDER

Type A35

FIRST developed in 1911, the Stevens *Type A* Recorder is used the world over. Fundamental principles of the instrument are the use of a continuous chart and an unlimited range of stages.

The *Type A35* consists essentially of a height element mechanism to register elevation of water surface above a chosen datum to a convenient scale, plus a time element mechanism to move a chart at a conveniently uniform speed. Visible graph strip charts 10″ or 20″ wide (also corresponding metric charts) . . . Weight-driven clock (synchronous electric clocks available on order) . . . Non-corrodible metal used throughout . . . One-piece protective hinged cover . . . The *Type A35* is adaptable to remote registration. Write for Bulletin No. 12.

LEUPOLD & STEVENS INSTRUMENTS

Manufacturers since 1907

PORTLAND 13, OREGON

Hydrographic • Surveying • Navigation

Automatic Controls

Leupold & Stevens Instruments
4445 N. E. Glisan St., Portland 13, Oregon

Please send Bulletin No. 12 on the Stevens *Type* A35 Recorder.

Name _____

Organization _____

Title _____

Street _____

City _____ *Zone* *State* _____

James B. Clow & Sons Purchase Iowa Valve Co.

James B. Clow & Sons, Chicago, has announced the purchase of the capital stock of the Iowa Valve Co. and will operate the Iowa Valve Co. as a separate corporation to be known under that name.

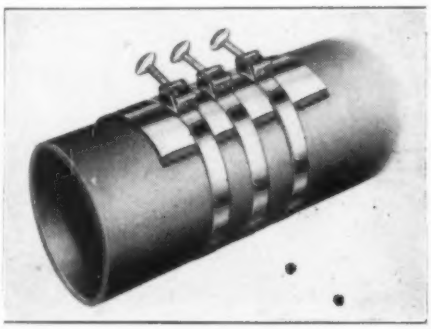
A. W. Read will continue in the company in the capacity of Vice Pres. and Gen. Mgr. in charge of the plant at Oskaloosa and will be assisted by his brother, Iver Read.

J. W. Dousette will continue as Gen. Sales Mgr. W. W. Corey, former president of the company, will act as adviser and consultant to the new management.

Other officers of the company will be K. S. Clow, Chicago, President; George P. O'Day, Chicago, Vice Pres., and E. F. Johnson, Chicago, Secy.-Treas.

Stainless Steel Pipe-Leak Clamp

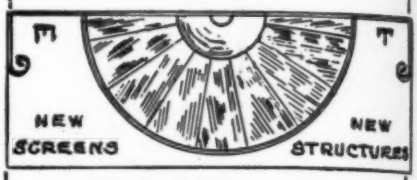
A new all stainless steel pipe-leak clamp that will not leak at pressures exceeding 240 psi. has been announced by Marman Products Co., Inc.



The clamp consists of a Hycar pad which is resistant to deterioration by water, gas, oil, gasoline, etc. An annealed backing plate covers the pad and can be hand-formed to the desired pipe contour. Pad and patch plate are secured over lead with Marman Universal Stainless Steel clamps of the continuous band type which have a size range from 9/16 in. up to the maximum diameter for clamp. One pipe-leak clamp can be used for numerous pipe diameters. Six sizes of Marman pipe-leak clamps fit all pipe diameters from 1.2 to 12 in. Sizes over 12 in. are available.

Write to Marman Products Co., Inc., Inglewood, Calif., for a folder illustrating these and other Marman clamps.

FINE SCREENS
FOR
SEWAGE
AND
INDUSTRIAL WASTES
TREATMENT



FORMER CONCEPTIONS
COMPLETELY OUTMODED

NO COSTLY, POWER CONSUMING REVOLVING BRUSH ARMS—25% GREATER SUBMERGED AREA.

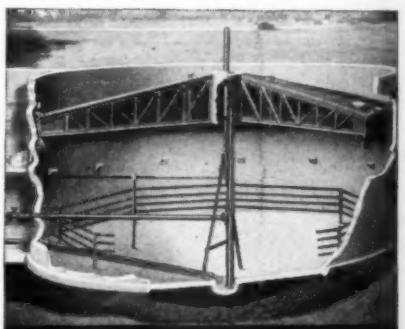
NEW SCREEN PLATES FOR THE ECONOMICAL USE OF A FILTER MEDIA ON THE SCREEN, THUS INSURING GREATER REMOVALS THAN POSSIBLE HITHERTO.

COMPLETELY AUTOMATIC CONTROL POSITIVE SEAL RINGS.

MODERN DESIGN
HIGHEST EFFICIENCIES
LOWEST COST

SANEQUIPMENT ENGINEERING
2843 WHITEWOOD AVE.
ANN ARBOR, MICHIGAN

DESIGNERS — CONSULTANTS



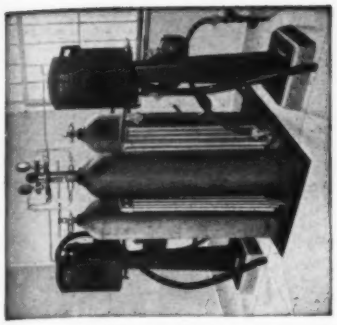
P.F.T. Supernatant Selector

provides a positive means of selecting and removing the best supernatant liquor from digestion tanks at a slow, continuous rate, regardless of location of supernatant in tank. Vertical slotted tube of selector extends through all zones where strata of supernatant form. Effective capacity of the tank for the reduction of solids is increased. Rate of withdrawal can be controlled within fairly close limits with the P.F.T. Supernatant Gauge, Sight-Glass and Sampler. Ask for Bulletin No. 243.

P.F.T. PACIFIC FLUSH TANK CO.
4241 RAVENSWOOD AVE., CHICAGO
NEW YORK • CHARLOTTE, N. C.
SAN FRANCISCO • LOS ANGELES

CHEMCO CHLORINATORS

CHEMCO CHLORINATORS
for
MUNICIPAL INSTALLATIONS



The efficient, continuous, automatic operation of CHEMCO CHLORINATORS in municipal and private installations for nearly a quarter of a century is proof of their extremely high quality and dependability. Illustration shows a CHEMCO CHLORINATOR installation in State of New York Institution Sewage Plant. CHEMCO CHLORINATORS provide the answer in every type of installation where chlorination is necessary. Send for bulletins Nos. 300-1, 300-3, 300-5 for full information on exclusive CHEMCO features.

CHEMICAL EQUIPMENT CO.
Main Office & Factory: 1700 N. Main St., Los Angeles 54
REPRESENTATIVES IN PRINCIPAL CITIES

LITERATURE AND CATALOGS

Sewage Pumps

Here's a catalog you may not have seen on **Non-Clogging Raw Sewage Pumps.** These pumps, made by Buffalo Pumps, Inc., are described in Bulletin 964-D. The bulletin shows vertical sewage pumps, horizontal sewage pumps, sewage ejectors and bilge pumps, as well as self-priming horizontal raw sewage pumps and vertical sewage ejectors.

In addition to the pictures of the various pumps, diagrammatic drawings are presented and the pumps' specifications are also included.

For further information on these Non-Clogging Raw Sewage Pumps write to Buffalo Pumps, Inc., Buffalo 5, N. Y.

Single-Stage and Multdigestion

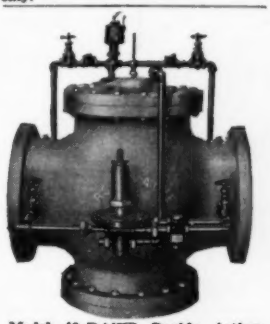
In a 58 page, two color bulletin No. 6261 titled **Dorr Digesters, Single-Stage and Multdigestion.** The Dorr Co. has set forth the history and practice of the art of digesting sewage sludge under controlled chemical, physical, and thermal conditions. One section of the bulletin is devoted to the calculations of sizes, heat losses, and heating requirements and typical examples are given of each case. Operating data from two dozen plants are presented in tabular form, and a list of installations of various types at cities covering a broad range in population is included.

One part of the bulletin deals with various types of Dorr Digesters presenting complete descriptions, photographs, general plan and elevation drawings, and specifications for eight different types of digesters. In addition, general engineering information covering such factors as the effect of temperature, stirring, time of digestion, etc., is also presented, as well as information on the effect of digestion period on reduction in volatile matter, and the relation between solids remaining after digestion and ash in sludges.

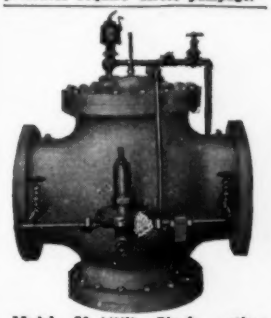
This thoroughly complete bulletin on single-stage and multdigestion may be obtained from The Dorr Co., 570 Lexington Ave., New York 22, N. Y.

Est. 1879
ROSS
AUTOMATIC VALVES

Altitude Valves for tank and reservoir, with two sets of controls—Automatic Hydraulic and Electric Remote Control. Hydraulic pilot normally operates the valve, while electric pilot is used for emergency only.



Model 40-DAWR Double Acting may be operated by electric pilot regardless of elevation of water in tank or reservoir, for a break in supply or distribution and when fire pressures require direct pumpage.



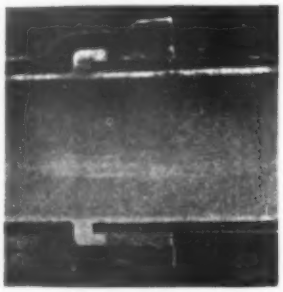
Model 30-AWR Single acting valve may be controlled in same manner as the Model 40-DAWR.

Model 40-AWR Single Acting semi-throttling valve will close on reversal of flow and the electric pilot would serve only a single purpose—either to open wide or close as emergency may require.

ROSS VALVE MFG. CO.
Incorporated
P.O. BOX 595, TROY, N.Y.

The TATE Cement Lining Process
Restores efficiency of old Water Mains

Now is the time to investigate the Tate Cement Lining process —and see what it can do to restore the efficiency of your old water mains.



View showing Tate Process in Pipe Joint. Note thoroughness of Lining.

Write for Literature.

What the TATE Process accomplishes

1. Water mains cleaned and cement-lined without removing pipe.
2. Eliminates discoloration and further cleaning costs.
3. Reduces pumping costs.
4. Restores reduction in head and flow co-efficients. This means full fire protection and lowered insurance rates.
5. All joints cement-lined . . . just one continuous pipe.
6. Does the job without interruption of service to consumer.

TATE PIPE LININGS, Inc.
ANDOVER, MASS.

FEED-METERS-MIXES
CHLORINE GAS ACCURATELY
SterElators by Everson

PURIFICATION FOR WATER-SEWAGE & SWIMMING POOLS

Everson SterElators Operate Manually or Semi-Automatically, Also Automatically Proportion Gas Flow to Water Flow.

Everson SterElators Utilize a 24" Water Gauge Vacuum and Visible Flow Meters, with Wide Ratio Ranges of Capacities: 10 to 1, 50 to 1, 110 to 1.

All SterElators Are Dependable, Accurate, Safe and Easy to Operate. Guaranteed to Give Complete Satisfaction.

SterElators by Everson
EVERSON MFG. CO.
233 W. Huron Street
Chicago 10, Ill., U. S. A.

WRITE FOR INFORMATION

VOGT BROTHERS TRAFFIC MODEL FIRE HYDRANT

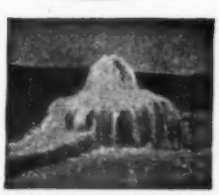
A.W.W.A.

VOGT BROTHERS MFG. CO. Incorporated LOUISVILLE, KY.
MAIN AT 14th
VOGT
VOGT MFG. CO., Incorporated
P. O. BOX 1122 LOUISVILLE, KY.

AERO-MIX

AERATOR—MIXER

A Size and Type to Fit Your Problem In Water or Sewage Treatment.



WRITE FOR INFORMATION

Liquid Conditioning Equipment

The Liquid Conditioning Corp. of New York has issued three bulletins within recent weeks. Bulletin No. 1 describes **Clarifying Filters, Chemical Feeders, and Sludge Contract Reactors;** bulletin No. 2 deals with **Deaerating Heaters and Vacuum Deaerators;** while bulletin No. 3 describes **Oil Removal Filters.**

Copies of any or all of these bulletins may be obtained by writing the Liquid Conditioning Corp., 423 W. 126th St., New York 27, N. Y.

Heating Equipment

The American Radiator and Standard Sanitary Corp. has released a new section for its general catalog. This section is a complete catalog of **Radiator Heating Equipment.** Among the new products and developments are the American Arcoline Wet Base Boiler and the American Exbrook Boiler.

The catalog contains information and data about boilers, radiators, connectors and enclosures, oil burners, water heaters, gas converters and heating accessories, including hundreds of products for residential, commercial, institutional, and special heating requirements.

The catalog on Heating Equipment may be obtained from American Radiator & Standard Sanitary Corp., Pittsburgh 30, Pa.

Analytical Determinations

Wilkens-Anderson Co. has issued a **Waco Technical Service Bulletin** in which are described various analytical determinations made with the Coleman Universal Spectrophotometer. Among the determinations which can be made with this apparatus are calcium in zeolite softened and condenser waters, sodium metaphosphate in treated waters, nitrate nitrogen in water, lead in drinking water, silica in boiler water and steam, and magnesium in boiler water.

This bulletin gives complete directions for making the determinations and may be obtained from Wilkens-Anderson Co., 111 N. Canal St., Chicago.

Water Stabilization and Scale Prevention

The National Aluminate Corp. has issued Bulletin No. 34 on **Stabilizing Treatment of Water for Non-Recirculating Systems.** By means of pictures and diagrams, the

bulletin presents the Nalco controlled stabilization system for the prevention of scale formation and corrosion. In addition, a number of questions and answers about stabilization are given with particular reference to process and potable waters in non-recirculating systems.

Bulletin No. 34 may be obtained from the National Aluminate Corp., 6216 W. 66th Place, Chicago 38, Ill.

Corrosion Resistant Material

In the December issue of the **Crane Valve World** there appears an article titled "Aids to the Selection of Corrosion Resisting Piping Material." Included in this article is a corrosion questionnaire, the answers to which will give an indication of the proper material to be selected to prevent corrosion, particularly in pipe lines. The body of the article takes up the 16 questions and discusses each of them.

The author of the article is L. G. Vande Bogart, Research Engineer of the Crane Co. Dr. Bogart is the man who developed the 8-page text and colored "stop and go" Corrosion Charts for the Valve World, reviewed in *Water & Sewage Works* some time ago.

Persons interested in the subject of corrosion and corrosion resisting material may wish to obtain a copy of the November-December 1946 issue of the Valve World. If so, write to Valve World, 836 South Michigan Ave., Chicago 5, Ill.

Packaged Power Unit

Not long ago we ran a news item in the Equipment News section of this magazine on the new **Link-Belt Electrofluid Drive.** Now one may obtain a bulletin describing this new packaged power unit.

This 16 page bulletin, Book Number 2085, tells why the Link-Belt engineers created the Electrofluid Drive to save money by making it unnecessary to "overmotor," to prevent damage to costly power-driven equipment, to insure continuous trouble-free operation, to prevent long work stoppages, and to provide easy installation. The bulletin also shows a picture of the unit and a cutaway drawing, as well as diagrams indicating the power input and output of the unit. A dimension table and a list of where the units can be used are also included.

A copy of Book Number 2085 may be obtained from the Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.

HYDRO-TITE

HYDRO-TITE—the self-caulking joint compound that makes cast iron water pipe joints—strong—tight—flexible and everlasting. Used on thousands of miles of pipe with a record of more than 30 years without a failure.

FIBREX—The sanitary paper packing that is used like braided jute. Free from bacteria—treated with a water repellent—put up in 60 pound reels. 70 pounds of Fibrex takes the place of 100 pounds of braided jute.

HYDRAULIC DEVELOPMENT CORPORATION
50 Church St.
New York, N. Y.

DRY BRAIDED
Fibrex

GATE VALVE OPERATION

★ SAFE ★ RELIABLE ★ QUICK ★

By

The Dean Truck Mounted Valve Operator

Write for Literature

PAYNE DEAN & CO. P.O. Box 271 MADISON, CONN.

TAKE THE GUESS WORK OUT OF CHEMICAL FEEDING

With the OMEGA "Belt Type" Gravimetric Feeder there's no worrying about over or under feeding. Automatic alarms will call you if anything is wrong. Feeding is entirely automatic and continuous by means of a mechanically vibrated feeding tray delivering to an enclosed weigh belt. Vibration is controlled effortlessly by the scale beam through the patented OMEGA wedge control. A handwheel adjustment of OMEGA's variable speed drive controls the belt speed and gives an infinite number of feeding rates between minimum and maximum. Feeder may be bolted to storage bin or supplied by chute.

OMEGA Dust Removers are available to protect your workers and equipment.

OMEGA BELT-TYPE GRAVIMETRIC FEEDER

Design is simple and rugged. Totalizer shows amount fed.

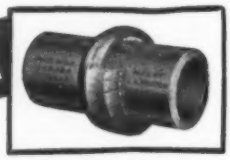
Write for Bulletin.

OMEGA PRODUCTS
Volumetric Feeders • Gravimetric Feeders
Solution Feeders • Lime Slaking Equipment
Bucket Elevators • Laboratory Stirrers

OMEGA MACHINE CO.
(Division of Builders Iron Foundry)
10 CODDING ST., PROVIDENCE 1, R. I.

OMEGA

REPAIR and SAVE
Water Meter
Measuring Chambers
with the
MEMPHIS SLOT INSERT
of stainless steel with new bronze thrust roller.
For further information and *free* 5/8" samples
address
METER SPECIALTY CO.
1332 N. Seventh St. Memphis, Tenn.

WESTON

GASKET AND FORM
The Perfected Method for Making Sewer Pipe Joints of Cement
- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

L. A. WESTON **Adams, Mass.**

Rx for a headache!!
$Fe_2(SO_4)_3$ **FERRI-FLOC**
Apply to affected water in small doses. Relief should be immediate.
Free information and samples can be acquired from
Tennessee Corporation
Department W.S.W.,
Atlanta, Georgia

ZECO GREENSAND ZEOLITE
ZECO and HI ZECO Greensand Zeolite for water softening, filtration and iron removal. ZECO Manganese Zeolite for iron and manganese removal. COREXITE mineral for corrosion control and water stabilization.
ZEOLITE CHEMICAL CO.
Sales Office 150 Cedar St. New York, N. Y. Factory Medford, N. J.
Pioneer Producer of GREENSAND ZEOLITE MINERAL

Valves

Seven types of valves presenting examples of more than 1500 types and sizes made by the Golden-Anderson Valve Speciality Co. are described and illustrated in a 4-page bulletin entitled **Valves.**

Included in the new bulletin are the Golden-Anderson Water Pressure Reducing Valves, Single Acting Standard Altitude Valves, Integral Pilot Type Cold Water Float Valves, Railroad Track Pan Float Valves, and Water Strainers, as well as Railroad Standpipe Water Columns and Railroad Standpipe Valves.

This bulletin may be obtained from Golden-Anderson Valve Specialty Co., 1708 Keenan Bldg., Pittsburgh 22, Pa.

Insulation

The Magnesia Insulation Manufacturers' Association at 1317 "F" St., N. W., Washington, D. C., issues the **Mima News** quarterly. This 4 page bulletin contains information on insulation and its application, and in this particular issue (Vol. No. 2, Fall, 1946) is an item on high temperature insulation and the diatoms from which it comes. There is also a short article titled "Use a 1946 Yardstick on Your Insulation!"

Copies of this bulletin may be obtained from the Association at the above address.

Proportioning Pumps

If you have a chemical dosage equivalent to one pint per hour or 46 gallons per minute, you will be interested in Catalog No. 146, **Milton Roy Controlled Volume Chemical and High Pressure Pumps.**

This 32 page bulletin describes the standard simplex and duplex type pumps for pumping in controlled meter volume from one pint to 2600 gallons per hour against pressures up to 20,000 psi.

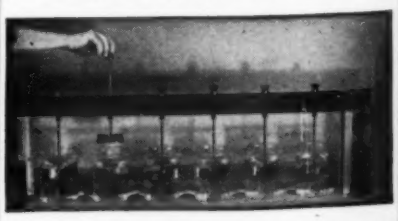
These are the pumps with the exclusive step-valve design, and the bulletin shows not only the design of the step-valve, but also the precise volume-control method, packing glands and seals, the application of electronics to automatic volume control, and cuts of various individual pumps employing these features.

Also included in the bulletin are capacity pressure selection tables and a table giving suggested mate-

EDSON
DIAPHRAGM PUMPS
Hand Sizes 2", 2½", 3", 4"
Power Sizes 3" and 4"
Open Discharge or Force Pump
Edson Special Suction Hose
Red Seal Diaphragms
Strainers and Foot Valves
Hose Spanners—Adapters
THE EDSON CORPORATION
Main Office and Works: 49 D St. South Boston, Mass.
New York: 142 Ashland Pl., Brooklyn

BOND-O
Sulphur Joint Compound
Our BETTER BLENDING means that each batch of BOND-O comes out of our machines exactly compounded and thoroughly mixed. Cast iron pipe joints made with BOND-O show this difference. Less initial leakage from every joint made.
NORTHROP & COMPANY, INC.
50 CHURCH STREET
NEW YORK 7, N. Y.

ANTHRAFILT
A Filter Medium For All Purposes
ANTHRACITE EQUIPMENT CORP.
101 Park Ave. New York
All correspondence regarding sales and engineering should be addressed to:
PALMER FILTER EQUIPMENT CO.
822 E. 8th St. Erie, Pa.
Engineers and Sales Agents

THE *Phipps & Bird* LABORATORY MIXER . . .

IS the important piece of equipment in the Modern Water Works Laboratory. Now being used by leaders in water works research. Many superintendents and chemists have been able to reduce their chemical costs by the control of chemical dosages with this mixer. Write for literature.
PHIPPS & BIRD, INC. **Richmond, Va.**

rials of construction for different liquids to be handled.

Catalog No. 146 may be obtained by writing to Milton Roy Co., 1300 E. Mermaid Ave., Chestnut Hill, Philadelphia 18, Pa.

C.I. Pipe Story

As is customary, the December 1946 issue of **The U. S. Piper** contains several stories on cast iron pipe. One of these concerns a new supply line to the Ford factory in St. Louis County. Another discusses the water system in an army air field, while a third tells the story of the Forest Lawn Memorial Park Cemetery water system in Glendale, Calif.

The U. S. Piper may be obtained from the U. S. Pipe & Foundry Co., Burlington, N. J.

Dresser's Annual Report

Although water and sewage works superintendents probably cannot spend enough money to produce annual reports similar to the **Dresser Industries, Inc., Annual Report for 1946**, still it may be possible from this to get some good ideas on how to dress up a report.

Included in the report are pictures and descriptions of equipment used in this field, as well as financial and operating data.

The Dresser Industries, Inc., are located at Cleveland 13, Ohio.

APPLICATION 50%

GIVEN THE BEST COATING THAT SCIENCE AND SKILL CAN PRODUCE TO PROTECT METAL AGAINST THE INROADS OF RUST AND CORROSION, IT'S REAL EFFECTIVENESS DEPENDS UPON *APPLICATION.*

AS NATIONALLY APPROVED APPLIERS OF SUCH MATERIALS AS *NO-OX-ID, BARRETT* AND OTHER COATINGS, OUR EXPERIENCE IS HELPFUL IN GETTING YOU THE UTMOST IN PROTECTION.

WE SPECIALIZE IN THE SURFACE TREATMENT OF STEEL STANDPIPES, TANKS, WATERMAINS AND OTHER WATERWORKS AND BUILDING INSTALLATIONS.

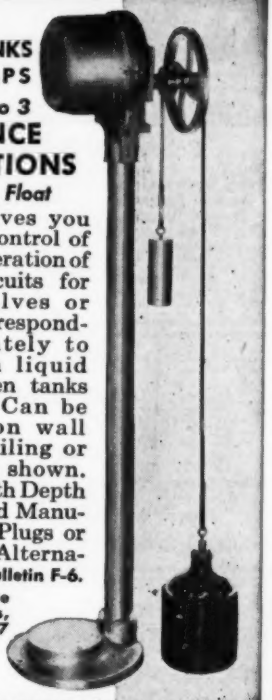
Send for Free Booklet

B W. A. BRIGGS BITUMEN Co.

3303 Richmond Street, Philadelphia 34, Pa.

Alfred Conhagen, Inc., 429 W. 17th St. Telephone Chelsea 2-1676 New York representative.

FLOATROL



For OPEN TANKS and SUMPS

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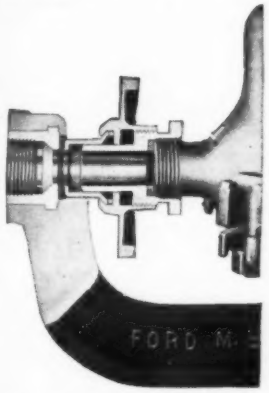

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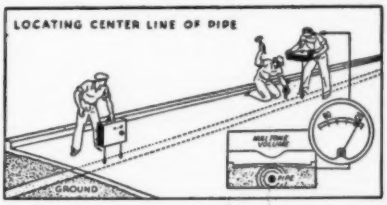

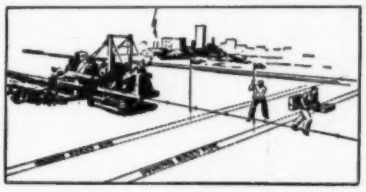

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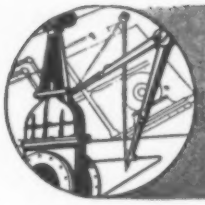

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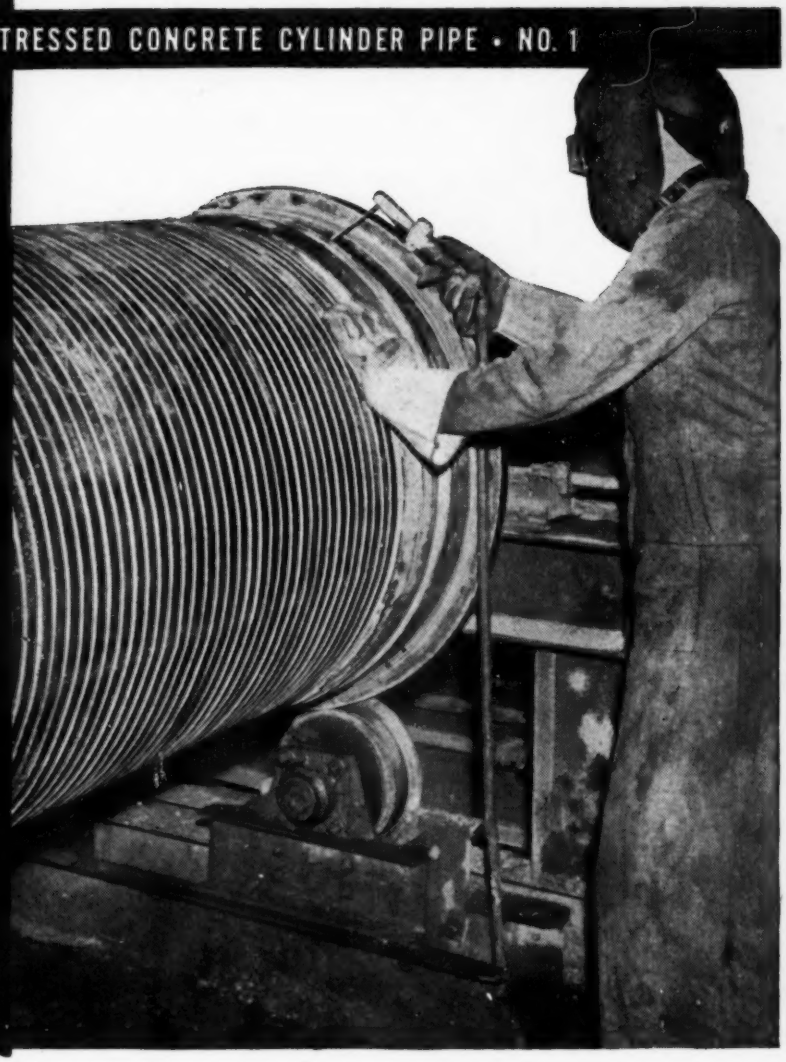

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